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Announcement of the Thirty-Second

Summer Session

1923

July 7—August 17

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PUBLISHER'S NOTE

This pamphlet is designed to give prospective students detailed information about the Summer Session of Cornell University. For information about the University generally and about the work of its several colleges during the academic year, the *General Circular of Information* should be consulted. That circular and the announcements of the several colleges of the University are listed on the last page of the cover of this pamphlet. Any one of them can be obtained by applying to the Secretary of Cornell University, Ithaca, New York.

SUMMER COURSES IN LAW

For information about summer courses in Law to be given at Cornell University in 1923, see page 48.

SUMMER SCHOOL OF BIOLOGY

For information about summer courses in Biology to be given at Cornell University in 1923, see page 51.

THE SESSION MUST BEGIN PROMPTLY

In order to get the full number of exercises announced for the Summer Session, it is necessary that all work begin promptly on Monday morning, July 9. Students are urged, therefore, to reach Ithaca in time to be present at the first exercise of each class. If possible, the student should register on Saturday, July 7; if not, then on Monday, July 9, in an hour not occupied by class work.

THE CALENDAR.

Summer Session of 1923

- July 7... Saturday, 8 A.M.—5 P.M.. Registration, Room A, Goldwin Smith Hall.
- July 9... Monday Instruction begins at time and place announced under each course. Registration continued at the Registrar's Office, Morrill Hall.
- July 9... Monday, 8 P.M. Opening Convocation, Bailey Hall. Address by Dr. Frank Pierrepont Graves, Commissioner of Education and President of the University of the State of New York.
- July 10. . Tuesday evening and following Tuesdays. . . . Organ Recital, Sage Chapel.
- July 11. Wednesday evening and following Wednesdays. Departmental Lectures and Conferences.
- July 12. Thursday evening and following Thursdays. . . Piano Recital, Mr. E. R. Kroeger.
- July 13... Friday, until 4 P.M. Last day for payment of fees at the Treasurer's Office, 1 Morrill Hall.
- July 15... Sunday, 11 A.M. and following Sundays. . . . Public Worship and Preaching in Sage Chapel.
- July 15... Sunday evening and following Sundays. . . . Organ Recital, Bailey Hall.
- July 16... Monday evening and following Mondays Lecture Course, Barnes Hall.
- July 20... Friday evening. Concert. Mabel Garrison, Soprano, Bailey Hall.
- August 3.. Friday evening. Concert. Felix Salmond, Violoncellist, and Richard Crooks, Tenor, Bailey Hall.
- August 17. Friday. Summer Session ends.

The *Weekly Calendar* of the University carries announcements of all public exercises held in connection with the Summer Session.

THE SUMMER SESSION, 1923

OFFICERS

The President of the University

LIVINGSTON FARRAND, A.B., M.D., L.H.D., LL.D.

The Registrar of the University

DAVID FLETCHER HOY, M.S.

The Dean of Women

GEORGIA LAURA WHITE, Ph.D.

Administrative Board of the Summer Session

JAMES EDWIN CREIGHTON, Ph.D., LL.D., Dean of the Graduate School

DEXTER SIMPSON KIMBALL, M.E., Dean of the College of Engineering

The Dean of the College of Arts and Sciences

Executive Committee

ROBERT MORRIS OGDEN, Ph.D., *Chairman*

BENTON SULLIVAN MONROE, Ph.D., *Secretary*

STAFF OF INSTRUCTION*

ALFRED W. ABRAMS.....	Education
(Chief, Visual Instruction Division, New York State Department of Education)	
BRISTOW ADAMS, B. A.....	Drawing and Painting
(Professor in the Extension Service)	
ERNEST ALBEE, Ph.D.....	Philosophy
(Professor of Philosophy)	
JOSÉ B. ALEMANY, A.M.....	Spanish
(Instructor in Spanish, Syracuse University)	
GEORGE GORDON ANDREWS, Ph.D.....	History
(Acting Assistant Professor of English History)	
JAMES FOSDICK BALDWIN, A.B., Ph.D.....	History
(Professor of History, Vassar College)	
HYMAN CHONON BERKOWITZ, A.M.....	Spanish
(Instructor in Romance Languages)	
CHARLES CLARENCE BIDWELL, Ph.D.....	Physics
(Assistant Professor of Physics)	
HOMER GUY BISHOP, Ph.D.....	Psychology
(Instructor in Psychology)	
ARTHUR EDWARD ROMILLY BOAK, Ph.D.....	History
(Professor of Ancient History, University of Michigan)	
ALBERT WILHELM BOESCHE, Ph.D.....	German
(Professor of German)	
SAMUEL LATIMER BOOTHROYD, B.S.....	Astronomy
(Professor of Astronomy and Geodesy)	

*The names of the instructors in the Summer School in Agriculture are given on page 57; of those in the Summer School in Law, on page 48; of those in the Summer School of Biology, on page 51.

SAMUEL TILDEN BRATTON, A.M.	Geography
(Associate Professor of Geology and Geography, University of Missouri)	
JULIAN PLEASANT BRETZ, Ph.D.	History
(Professor of American History)	
THOMAS ROLAND BRIGGS, Ph.D.	Chemistry
(Assistant Professor of Physical Chemistry and Electro-Chemistry)	
ARTHUR WESLEY BROWNE, Ph.D.	Chemistry
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EARLE NELSON BURROWS, M.C.E.	Structural Engineering
(Assistant Professor of Bridge Engineering)	
ALAN DITCHFIELD CAMPBELL, A.M.	Mathematics
(Instructor in Mathematics)	
HARRY CAPLAN, Ph.D.	Public Speaking
(Instructor in Public Speaking)	
WALTER BUCKINGHAM CARVER, Ph.D.	Mathematics
(Assistant Professor of Mathematics)	
JACOB ROLAND COLLINS, Ph.D.	Physics
(Assistant Professor of Physics)	
WALTER RODNEY CORNELL, B.S.	Mechanics
(Assistant Professor of the Mechanics of Engineering)	
RALPH THOMAS KLINE CORNWELL, B.Chem.	Chemistry
(Instructor in Chemistry)	
LOUISE COURTOIS, A.M.	French
(Instructor in French, University of Oklahoma)	
CLYDE FIRMAN CRAIG, Ph.D.	Mathematics
(Assistant Professor of Mathematics)	
G. WATTS CUNNINGHAM, Ph.D.	Philosophy
(Professor of Philosophy, University of Texas)	
KARL M. DALLENBACH, Ph.D.	Psychology
(Assistant Professor of Psychology)	
WALTER LEISENRING DIMM, B.S.	Chemistry
(Assistant in Chemistry)	
HENRY GRATTAN DOYLE, A.M.	Spanish
(Professor of Romance Languages, George Washington University)	
ALEXANDER M. DRUMMOND, A.M.	Public Speaking
(Professor of Public Speaking)	
CHARLES LOVE DURHAM, Ph.D., Litt. D.	Latin
(Professor of Latin)	
DONALD ENGLISH, B.S., M.B.A.	Economics
(Professor of Economics and Accounting)	
FREDERICK EBELL FISKE, Ph.D.	English
(Assistant Professor of English)	
JOSEPH SUTLIFF FONDA, B.Chem.	Chemistry
(Assistant in Chemistry)	
EDGAR STEVENSON FURNISS, Ph.D.	Economics
(Assistant Professor of Political Economy, Yale University)	
KARL WILSON GEHRKENS, A.M.	Music
(Professor of School Music, Oberlin Conservatory of Music)	
JEAN M. GÉLAS.	Physical Education
(Instructor in Physical Education, Hamilton College)	
SIDNEY GONZALES GEORGE, C.E.	Mechanics
(Professor of Applied Mechanics)	

ARTHUR WARD GILBERT, B.S.	Education
(Assistant in Education)	
DAVID CLINTON GILLESPIE, Ph.D.	Mathematics
(Assistant Professor of Mathematics)	
HERBERT JOHN CLIFFORD GRIERSON, M.A., LL.D., D. Litt.	English
(Professor of Rhetoric and English Literature, University of Edinburgh)	
VINCENT LOUIS GUILLOTON, Agrégé des Lettres	French
(Associate Professor of French, Syracuse University)	
FREDERICK SQUIRE HEMRY, A.M.	French
(Head of Department of Modern Languages, Tome School)	
EMILY HICKMAN, Ph.D.	History
(Professor of History, Wells College)	
FRED G. HOFFHERR, Bachelier ès Lettres	French
(Instructor in French, Columbia University)	
LOUIS BENJAMIN HOISINGTON, Ph.D.	Psychology
(Assistant Professor of Psychology)	
ROBERT CHARLES HOUCK, B.Chem.	Chemistry
(Assistant in Chemistry)	
HARLEY EARL HOWE, Ph.D.	Physics
(Assistant Professor of Physics)	
ERIC VAIL HOWELL, M.C.E.	Mechanics
(Instructor in Civil Engineering)	
HOYT HOPEWELL HUDSON, M.A.	Public Speaking
(Instructor in Public Speaking)	
EVERETT LEE HUNT, A.B.	Public Speaking
(Assistant Professor of Public Speaking)	
WALLIE ABRAHAM HURWITZ, Ph.D.	Mathematics
(Assistant Professor of Mathematics)	
CLYDE R. JEFFORDS, Ph.D.	Latin
(Chairman, Department of Latin, Newtown High School, Queens, New York City)	
RIVERDA HARDING JORDAN, Ph.D.	Education
(Professor of Education)	
DEXTER MERRIAM KEEZER, A.B.	Economics
(Instructor in Economics)	
MYRON SLADE KENDRICK, A.M.	Economics
(Instructor in Economics)	
EARLE HESSE KENNARD, Ph.D.	Physics
(Assistant Professor of Physics)	
ERNEST RICHARD KROEGER	Music
(Director, Kroeger School of Music, St. Louis)	
HAROLD TALBOT LACEY, B.Chem.	Chemistry
(Assistant in Chemistry)	
RENÉ LAMA, Agrégé des Lettres	French
(Professor, Lycée de Beauvais)	
JAMES FREDERICK MASON, Ph.D.	French
(Professor of the Romance Languages and Literatures)	
PAUL MCCORKLE, M.S.	Physics
(Instructor in Physics)	
ASA EMANUEL MCKINNEY, A.M.	Chemistry
(Instructor in Chemistry)	
VICTOR ELVERT MONNETT, Ph.D.	Geology
(Associate Professor of Geology, University of Oklahoma)	

BENTON SULLIVAN MONROE, Ph.D.	English
(Assistant Professor of English)	
DAVID WILSON MOORE	Chemistry
(Assistant in Chemistry)	
DAVID SHERMAN MORSE, A.M.	Mathematics
(Instructor in Mathematics)	
GUY BROOKS MUCHMORE, A.B.	Public Speaking
(Assistant Professor of Public Speaking)	
CARLETON CHASE MURDOCK, Ph.D.	Physics
(Assistant Professor of Physics)	
MELVIN L. NICHOLS, B.Chem., Ph.D.	Chemistry
(Assistant Professor of Analytical Chemistry)	
PAUL ALLEN NORTHROP, B.S.	Physics
(Instructor in Physics)	
CLARK SUTHERLAND NORTHUP, Ph.D.	English
(Professor of English and Librarian of the Hart Memorial Library)	
ROBERT MORRIS OGDEN, Ph.D.	Education
(Professor of Education)	
WILLIAM RIDGELY ORNDORFF, Ph.D.	Chemistry
(Professor of Organic and Physiological Chemistry)	
FREDERICK WILLIAM OWENS, Ph.D.	Mathematics
(Assistant Professor of Mathematics)	
CHARLES H. PATTERSON	Shop-Work
(Assistant in Foundry)	
HAROLD CHARLES PERKINS, M.E.	Mechanics
(Instructor in Mechanics)	
MILES ALBION POND, Ph.B.	Descriptive Geometry
(Assistant Professor of Civil Engineering)	
PAUL RUSSEL POPE, Ph.D.	German
(Professor of German)	
JAMES T. QUARLES	Music
(University Organist and Assistant Professor of Music)	
FRANK WALTER REED, Ph.D.	Mathematics
(Instructor in Mathematics)	
ARTHUR JOHN RIDER, M.S.	Chemistry
(Instructor in Chemistry)	
GEORGE MERRITT ROBISON, Ph.D.	Mathematics
(Instructor in Mathematics)	
RASMUS S. SABY, Ph.D.	Government
(Assistant Professor of Political Science)	
MARTIN WRIGHT SAMPSON, M.A.	English
(Goldwin Smith Professor of English Literature)	
GERALD DEWITT SANDERS, Ph.D.	English
(Instructor in English)	
FRANCIS ROBERT SHARPE, Ph.D.	Mathematics
(Professor of Mathematics)	
DEAN FRANKLIN SMILEY, M.D.	Hygiene
(Assistant Professor of Hygiene and Medical Adviser)	
VIRGIL SNYDER, Ph.D.	Mathematics
(Professor of Mathematics)	
WALTER KING STONE	Drawing and Painting
(Acting Assistant Professor of Drawing)	
WILLIAM STRUNK, jr., Ph.D.	English
(Professor of English)	

- JASPER LEONIDAS STUCKEY, A.B. Geology and Geography
(Assistant in Physical Geography)
- EDWARD BRADFORD TITCHENER, Ph.D., LL.D., D.Sc., Litt.D. Psychology
(Sage Professor of Psychology in the Graduate School, Lecturer in Psychology)
- CLARENCE ELLSWORTH TOWNSEND, M.E. Mechanical Drawing
(Assistant Professor of Drawing in the College of Engineering)
- LEONARD CHURCH URQUHART, C.E. Structural Engineering
(Assistant Professor of Civil Engineering)
- OSCAR DIEDERICH VON ENGELN, Ph.D. Geography and Geology
(Professor of Physical Geography)
- SETH WAKEMAN, Ph.D. Education
(Assistant Professor of Education)
- ULYSSES GRANT WEATHERLY, Ph.D., Litt.D. Economics
(Professor of Economics and Sociology, Indiana University)
- JOHN LEROY WEBER, C.E. Hydraulics
(Assistant Professor of Hydraulics)
- ALBERT EDWARD WELLS. Shop-Work
(Sibley Professor of Mechanic Arts)
- FRANK ERNEST WILLIAMS, A.M. Geography
(Assistant Professor of Geography and Industry, Wharton School,
University of Pennsylvania)
- WILLIAM LLOYD GARRISON WILLIAMS, Ph.D. Mathematics
(Assistant Professor of Mathematics)
- ARTHUR D. WRIGHT, A.M. Education
(Assistant Professor of Education, Dartmouth College)
- MIGUEL ZAPATA Y TORRES, A.B. Spanish
(Instructor in Romance Languages)
- KARL ABELL ZELLER, Ph.B., A.M. Physics
(Principal of High School, Niles, Ohio)

OBJECT OF THE SUMMER SESSION

The primary object of the Summer Session is to advance education by helping those engaged in it. The instruction is adapted to the needs of the following classes:

1. Professors and teachers in colleges and schools, superintendents, and supervisors of special branches of instruction.

The announcements of the different departments show a wide range of work. This work is either advanced and, therefore, suited to specialists who wish to pursue their individual study; or more elementary and adapted to teachers who desire to start in a new field. In addition to the instruction of the classroom, the University's libraries, museums, laboratories, and shops are open for use.

2. College students in Cornell or other universities who wish to make some scholastic use of the long vacation, especially those whose college studies may for one reason or another have been interrupted. In the case of graduates some of the courses offered may be counted toward an advanced degree. See *the Announcement of the Graduate School* for details regarding opportunities for advanced work and research during the summer.

Undergraduates may anticipate requirements and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount which may be obtained, are stated on pages 9 and 10.

3. Students entering the University and wishing to obtain surplus credit at entrance, or to complete the entrance requirements. It often happens that students have in June more or less than the requirements for admission to college. The Summer Session affords them the opportunity either to add to their surplus and thus, in some cases, to gain a year in time; or to make up their deficiency.

4. All persons qualified to pursue with profit any course given, whether or not they are engaged in formal study or teaching.

ADMISSION, ATTENDANCE, REGISTRATION

There are no examinations for admission to the Summer Session. For conditions of admission to courses in the Summer School in Agriculture, see page 58. Each person must, however, satisfy the instructor in charge of any course (unless it be elementary) that he is qualified to pursue the work. Any duly registered student of the Summer Session may visit such classes as he desires. **Admission to the classrooms is restricted to duly registered students.** Persons wishing to have work done during the Summer Session counted towards a degree, must conform to the regulations stated under the heading "Academic Credit for Work," page 9.

All students are required to register at the office of the Registrar. They may register on Saturday, July 7, between 8 a. m. and 5 p. m., or upon the day of their arrival, if they reach Ithaca on July 9 or later. Registration on July 7 is urged. Registration in advance of the dates here given is not required; prospective students need not apply in advance for registration blanks.

Class exercises begin at 8 a. m. Monday, July 9. Thereafter the Registrar's office is open from 9 a. m. to 4 p. m. every day except Saturday, when it is closed at noon.

Students who wish credit for graduate work must register not only with the Registrar but also with the Dean of the Graduate School, Room 22, Morrill Hall.

TUITION FEE

The single tuition fee, with the exceptions noted below, for the entire Summer Session, whether one course or more is taken, is \$40. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal within five days from the first registration day, for reasons satisfactory to the Comptroller and the Registrar, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks after the first registration day, one-half of the tuition may be refunded. In case of registration after the first three weeks of the session, students must pay two-thirds of the full tuition fee. No student is admitted without the payment of this fee. **Admission to classes is restricted to duly registered students.**

For tuition fee in the Summer School of Law see page 49.

For instruction in swimming and equitation an extra fee is charged. See p 39.

Instruction in the Summer School of Agriculture is free to students registered therein who have been residents of the State for at least one year. See page 58. For all others the tuition is the same as for other work, \$40. Free tuition does not include instruction in the Summer School of Biology or any instruction outside the College of Agriculture, nor are students receiving free tuition permitted to attend classes outside the College of Agriculture.

Students in the Summer School of Agriculture are required to pay an incidental fee of ten dollars. This fee is included in the forty dollars paid for tuition. See page 58.

Persons taking courses in the Summer School of Agriculture and in any department of the Summer Session must register in both the Summer School and the Summer Session, paying, however, only one tuition fee.

Any tuition fee or other fee may be changed by the Trustees to take effect at any time without previous notice.

LABORATORY FEES

Chemistry. A fee is charged for material actually consumed, and such deposit must be made with the Treasurer as the instructor may prescribe.

Physics. The fee in Physics is at the rate of \$1 for every five hours a week of work in the laboratory. The entire amount must be paid to the Treasurer at the beginning of the session.

Geography and Geology. In course S 8 and in course S 9 a fee of \$1 must be paid in advance to the Treasurer to cover incidental expenses of the course.

Shop-Work. Students not matriculated in the College of Engineering of Cornell University pay a fee of \$3.50 for each credit hour of shop-work for which they register.

Library Deposit. See under library, page 13.

Biology. See pages 52-56.

ACADEMIC CREDIT FOR WORK

In the College of Arts and Sciences. The academic requirements for the degree of Bachelor of Arts are the completion of one hundred and twenty hours of elective work. Before graduation a student must complete six hours in each of seven specified groups of study, thirty of these hours during the first two years,

under certain restrictions (the underclass requirements). During his last two years he must also elect twenty hours in some one department or group of related departments (the upperclass requirements).

To obtain credit toward the Cornell degree by means of work done in Summer Sessions, a student must have previously satisfied the entrance requirements of the College, and must obtain in advance the Dean's approval of his selection of courses. He may then obtain in any Summer Session credit for the number of hours he passes. To obtain credit for a term of residence he must pass a total of at least twelve hours in two or more Summer Sessions, with a minimum of four or a maximum of eight in each Session. Credit for two terms of residence, but no more, may be secured in this way.

In Other Colleges of the University. The nature and amount of credit allowed in other colleges at Cornell for work in the Summer Session may be learned from the statements under the announcement of each course.

In the Graduate School. Graduate work at Cornell is not expressed in terms of courses or of hours. A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may at once enter upon candidacy for an advanced degree if he is able to show that he has had adequate preliminary training in the subjects in which he proposes to work. The requirements for the degree do not depend primarily on the completion of any prescribed number of courses or of a fixed term of residence. They are rather based upon actual achievement in scholarship and research in the fields indicated by the major and minor subjects. The writing of a thesis and the passing of a special examination are also required. The minimum period of residence for the Master's degree is one academic year or its equivalent, and for the Doctor's degree three years.

Not all work done by a graduate student is graduate work in the strict sense of the term. Graduate work to be considered acceptable for a degree must be of advanced character in some field or department of knowledge. No residence towards a master's degree will be granted any student who does not register with the Dean of the Graduate School within three days after the opening of the Session, and who does not formally become a candidate for this degree under the direction of a special committee. The latest day for such registration in 1923 is July 12.

Students of the University Summer Session, of the Summer School of Biology, and of the Summer School in Agriculture who have been admitted to candidacy for an advanced degree are required to pay the regular tuition of the session but are exempt from tuition and administration fees in the Graduate School. On registering for the first time as candidates, students who have not previously matriculated in Cornell University will be given matriculation without payment of the usual fee on presenting a certificate that they have paid the tuition charges for the current Summer Session.

Students registered in the Graduate School and excused from tuition in the Summer School in Agriculture as residents of New York State are charged on their first registration in the Graduate School a matriculation fee of \$10, and for each session an administration fee of \$6.25.

The residence requirements for the degree of Master of Arts may be fulfilled

in whole or in part by attendance during the Summer Session of the University. For this purpose, two Summer Sessions will be regarded as the equivalent of one term, and four Summer Sessions as the equivalent of one year. Candidates for this degree who are in residence during Summer Sessions only are also required to continue their studies during the year under the direction of the chairman of the special committee in charge of their work.

Any person wishing to become a candidate for an advanced degree and to study during the Summer Session is advised to write to the professor whose work he expects to take, and also to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. It is much better to make these arrangements before coming to Ithaca, thus avoiding delay and interruption of study after the Summer Session has begun. In this way, moreover, it may be possible to secure the advice and guidance of professors in fields of study of which no specific mention is made in the announcements. Not all departments formally offer graduate work. In some departments, notably in the Summer School of Biology, opportunities for research may be had for a longer period than the six weeks during which courses are formally conducted.

In certain departments also an invitation is issued to scholars who are beyond the stage of regular graduate study to make use of the resources of the University in these fields for carrying on research.

CERTIFICATES FOR WORK DONE

Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for them must be made before August 16, and the applicant must leave at the office of the Registrar a large-sized envelope stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met.

COST OF LIVING

The cost of board and furnished room in Ithaca during the Summer Session runs from \$10 a week upwards. In some cases the cost has been reduced to \$9, but it is not safe to count upon less than this sum.

The price of a single furnished room may be as low as \$3 a week. The prices advance with the size and location of the rooms.

Rooms are engaged with the understanding that they will be occupied for the entire session, unless otherwise agreed upon by both parties. Table board is usually engaged by the week, or, if so stated, by the day.

A list of desirable rooms in private houses may be had on application after June 1. Students are cautioned against unauthorized rooming-house agents.

The price of table board runs from \$7 to \$10 in boarding houses. In cafeterias and restaurants, the average cost of meals amounts to about the same sum. Three cafeterias under the management of the University are easily accessible on the campus.

RESIDENTIAL HALLS, ROOMS, BOARD

1. **For Women.** The University has three residential halls for women in

which board and rooms may be obtained during the Summer Session by registered students only.

Rooms in these buildings will be reserved in the order of application. Each application for a room must be accompanied by a deposit of \$5; otherwise the application will not be entered. If the room assigned is occupied by the applicant the amount of this deposit is held until the end of the session to cover the return of keys, damage to building or furniture other than ordinary wear and tear, and to insure the completion of the lease. The deposit is refunded if the applicant gives formal notice to the manager on or before June 15 that she wishes to withdraw her application.

In Sage College, which accommodates 175, the charge for room, table board, and a specified amount of laundry, will be, for the session, from \$72 to \$84 according to the size and location of the room.

In Prudence Risley Hall, which accommodates 184, the charge will be from \$78 to \$84 according to the room occupied.

In both buildings this charge includes lodging Friday night, July 6 (not earlier), breakfast Saturday, July 7, and all meals to and including breakfast Saturday, August 18.

Members of the Summer Session who do not room in Sage College or Prudence Risley Hall may obtain table board at either. The charge is \$9 a week.

In Cascadilla Hall a furnished room may be had for the six weeks of the Summer Session at a cost of \$23 to \$29, this charge including a specified amount of laundry. This building is furnished like the others but has shower baths and not tubs. In this building the University maintains a dining-room and a cafeteria restaurant where meals may be had at reasonable rates.

Each of the residential halls is in charge of a warden, who is glad to know the students, to advise them in case of illness or other emergency, and to give them what information they may wish about the University, the town, and the community. It is understood that persons living in the Halls will conform to the house regulations made for the convenience and comfort of all.

Undergraduate women students of Cornell and other colleges and other women students under twenty-one years of age are expected to live in the Residential Halls or in one of the Approved Houses occupied exclusively by women and under the direct supervision of the Dean of Women.

A list of Approved Houses may be had on request after June 1, and also a supplementary list of houses available for older women who prefer to live outside of the Halls and Approved Houses.

It is not safe to engage rooms in places not recommended by the University. For room plans and all information relative to these Halls, and to other Approved Houses for women, apply to the Manager of Residential Halls, Sage College, Ithaca, N. Y.

2. **For Men.** Rooms in Baker Court will be available for men students. For room plans and all information concerning Baker Court, apply to the University Treasurer, Ithaca, N. Y.

Checks for reservation of room, or in payment of board bills, should be drawn to the order of Cornell University.

Self-support. Students, both men and women, who may wish to earn a part

of their expenses during the Summer Session, are invited to correspond in advance with the Manager of Residential Halls, Sage College, Ithaca, N. Y.

THE LIBRARIES

The University Library is open on week days from 8 a. m. to 10:30 p. m. In this building are the main library, containing about five hundred thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for more than two hundred readers, and contains a selected library of over 8,000 volumes of reference works. Below stairs is the periodical room in which are kept the current numbers of about five hundred journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, to a limited extent, allowed to take out books for home use. Persons wishing this privilege must make a deposit of \$5, which will be refunded upon the return of all books taken out.

The Library of the College of Agriculture, in the basement of Stone Hall, is open on week days from 9 a. m. to 5 p. m., except Saturday, when it is closed at 1 p. m. In it will be found a large collection of bulletins and reports of experiment stations, reference books on agriculture and country life, agricultural periodicals, and the like. The entomological library, in the Department of Entomology on the fourth floor of the main building, is one of the most complete of its kind in the United States. Nearly all the departments in which instruction is given have well-selected departmental libraries.

SAGE CHAPEL

Religious services are conducted in Sage Chapel throughout the academic year by eminent clergymen selected from the various religious denominations. There will be services in the Chapel on five Sundays during the Summer Session, July 15 to August 12, inclusive.

PHYSICAL EXAMINATIONS AND MEDICAL ADVICE

The medical advisers observe regular office hours, daily 10-12 a. m., at their respective offices in the gymnasium for men and in Sage College for women.

In cases of illness or indisposition which involve absence from classes even for one day, students are expected to report immediately either in person, by telephone, or by messenger to the medical advisers' office. For the convenience of the medical advisers such illness should be reported early in the day. Students who are indisposed but still able to attend classes should consult the medical advisers immediately in order that advice may be given and diagnosis of incipient diseases may be made promptly. Any student failing to report as soon as possible to the medical advisers any contagious or infectious disease will be regarded as guilty of a serious breach of discipline.

No charge is made for the services of the medical advisers.

A student may at any time be requested to withdraw from the University if, in the opinion of the University authorities, the condition of his health is such as to make it unwise for him to remain.

THE CORNELL INFIRMARY

The Cornell Infirmary is the former mansion of the late Henry Williams Sage, for many years chairman of the Board of Trustees of the University. At his death in 1897, his sons, Dean and William Henry Sage, endowed it and gave it to the University for a students' Infirmary as a memorial to their father. In 1912 a modern fireproof addition was erected with a capacity of sixty-two beds.

The Infirmary, which is in charge of an experienced superintendent, is thoroughly equipped in every way, and is open throughout the University year. It provides suitable rooms, food, and nursing for sick students. It has no medical staff; students employ their own physicians among practitioners in Ithaca or elsewhere.

Students in the University Summer Session and in the Summer School in Agriculture have all the privileges of admission to the Infirmary. They pay no fee in advance, but are liable to regular charges for services rendered.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular classroom work there will be public lectures on Monday evenings.

There are also lectures of general interest each week in connection with the various departments. Notice of these will be given in the University Calendar.

Organ recitals will be given on Tuesday evenings in the Sage Chapel and on Sunday evenings in Bailey Hall.

A piano lecture-recital will be given each week by Mr. Ernest R. Kroeger.

Two University concerts by distinguished artists will be given during the Summer Session. See the calendar on p. 2. Tickets for these concerts may be had at reduced rates by all students.

Wednesday evenings are devoted to the departmental conferences, which are open to all interested. Notice of these will be given from week to week.

In connection with the work of the several departments excursions are made to many points of interest. Some of these are open to all members of the Summer Session. Notable for their attractiveness are the excursions to Watkins Glen and to Niagara Falls.

RAILROAD ROUTES

Ithaca is reached by three railroads: the Lehigh Valley; the Delaware, Lackawanna, and Western; and the Central New York Southern. The Ithaca branch of the Lackawanna leaves the main line at Owego. Through trains run from New York and Buffalo on the Lehigh, and through sleeping cars run daily from New York on both roads. From Philadelphia, and from Baltimore, Washington, and the South via the Baltimore & Ohio, the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh, through trains for Ithaca connect with the New York Central at Auburn, and with the Pennsylvania (Northern Central) and the Erie at Elmira. Trains on the Central New York Southern also connect with the New York Central at Auburn.

COURSES OF INSTRUCTION

See index, p. 77.

Most of the courses offered consist of five exercises a week, one each week day except Saturday. The number of actual hours of class work in any course may be found by multiplying the number of weekly exercises by six.

The word "hour" used in reference to University credit means the equivalent of one class exercise a week for a half-year or one semester. One hundred and twenty such "hours" are required of candidates for the A.B. degree.

G. S. = Goldwin Smith Hall.

ASTRONOMY

S 1. General Astronomy. Credit two or three hours. Lectures and recitations, daily 8, *Lincoln* 39. Laboratory, T Th, 7:30-9:30 p. m., at the Observatory. Professor BOOTHROYD.

A general introductory course intended especially for teachers who may wish to prepare more thoroughly for teaching general science or geography. Lectures, recitations, and laboratory. The lectures are illustrated by means of models and lantern slides; the 12-inch equatorial and other instruments of the observatory are used for illustration in the laboratory. Young's *Manual of Astronomy* is used for reference.

CHEMISTRY

The courses announced below correspond entirely or in part with courses given during the regular sessions of the University. For regular students the requirements for admission to the various courses will be the same as during the year.

Teachers may be admitted to any course for which their general training or experience may be considered to prepare them. Every effort will be made to meet the individual needs of teachers by arranging and modifying the work as far as possible so as to fulfill the particular requirements in each case.

S 101. Introductory Inorganic Chemistry. Credit for a, b, and c, six hours.

(a) Lectures, daily except Sat., 12. *Rockefeller*. Professor BROWNE and Mr. MOORE. The lectures deal with the fundamental theories and laws of chemistry, and with the more common elements and their compounds. They are profusely illustrated by experiments. The course is primarily designed to meet the needs of teachers in secondary schools, and to that end emphasis is laid upon methods of lecture presentation and experimental demonstration. Students other than teachers must, before registering, satisfy the department that they are properly prepared to carry on the work.

(b) Laboratory work, M W, 8-12, and T Th F, 9-12. *Morse*. Mr. MCKINNEY and Mr. HOUCK. A series of experiments designed to illustrate the fundamental laws of chemistry and to acquaint the student with the properties of the principal elements and their compounds. For the benefit of teachers who may take the course special attention will be given to the methods of laboratory instruction, quantitative experiments, and the blowing of simple glass apparatus.

(c) Recitations. T Th F, 8. *Morse*. Mr. MCKINNEY. The recitations deal with the subject matter of the lectures and with the experimental work in the laboratory; thorough drill in the solution of chemical problems.

S 205. **Introductory Qualitative Analysis.** Credit one to six hours. Lectures and recitations, daily except Sat., 8. *Morse A.* Laboratory, daily except Sat., 1:30-4:30, and M W F. 9-12. Mr. RIDER and Mr. DIMM.

This course comprises (1) a study in classroom and laboratory of the methods for detecting each of the important acids in the presence of the others, together with the reactions involved, followed by the analysis of more complex mixtures than those assigned in course S 210; and (2) a comparative study in the laboratory of different methods of detecting and separating the bases.

S 210. **Introductory Qualitative Analysis. Shorter Course.** Credit three hours. Lectures, M W F, 11. *Morse C.* Laboratory, daily except Sat., 1:30-4:30. Mr. RIDER and Mr. DIMM.

An elementary course for those who have had the equivalent of course S 101. A study in laboratory and classroom of the methods of detecting and separating the principal bases and inorganic acids. This is followed by the analysis of various substances, either in solution or in solid form, the composition of which is unknown to the students. Considerable emphasis is laid upon the writing of equations expressing the reactions involved in the work.

S 220. **Introductory Quantitative Analysis.** Credit six hours. Lectures, recitations, and laboratory practice. Lectures, daily except Sat., 8. *Morse C.* Laboratory, daily except Sat., 9-1. Assistant Professor NICHOLS and Mr. FONDA.

The preparation and standardization of various volumetric solutions and their use in analyzing a variety of substances; gravimetric methods; stoichiometry.

S 225. **Introductory Quantitative Analysis. Shorter course.** Credit three hours. Lectures and laboratory practice. Lectures, T Th, 11, *Morse C.* Laboratory, daily except Sat., 8-11. Assistant Professor NICHOLS and Mr. FONDA.

The preparation and use of volumetric solutions and work in elementary gravimetric analysis.

S 230. **Advanced Quantitative Analysis.** Credit two to four hours. Recitations and laboratory practice. Prerequisite course 220. Laboratory, daily except Sat., 8-1. Recitation at hours to be arranged. Assistant Professor NICHOLS and Mr. FONDA.

Gravimetric, volumetric, and electrolytic methods of analysis, and methods of combustion analysis; analyses of iron and steel, alloys, special steels, slags, coal and coke, cement and cement materials, and ores of copper, lead, zinc, mercury, manganese, tin, tungsten, chromium, etc.

S 305. **Introductory Organic Chemistry.**

A. **Aliphatic Compounds.** Credit three hours. Lectures and written reviews. Daily, 9. *Morse 119.* Professor ORNDORFF and Mr. LACEY.

B. **Aromatic Compounds.** Credit three hours. Lectures and written reviews. Daily, 8. *Morse B.* Open to those who have had or who are taking S 305 A. Mr. CORNWELL and Mr. LACEY.

The lectures discuss systematically the more important compounds of carbon, their occurrence, methods of preparation, reactions, relations, and uses.

S 310. **Introductory Organic Chemistry.**

A. **Aliphatic Compounds.** Credit one to three hours. Laboratory practice

and oral reviews. Open to those who have had or are taking S 305 A. Hours to be arranged. Mr. CORNWELL and Mr. LACEY.

B. Aromatic Compounds. Credit one to three hours. Laboratory practice and oral reviews. Open to those who have had or are taking S 305 B and S 310 A. Hours to be arranged. Mr. CORNWELL and Mr. LACEY.

The student prepares a large number of typical compounds of carbon, and familiarizes himself with their properties, reactions, and relations. It is recommended that S 305 A and S 310 A be taken in one summer, and that S 305 B and S 310 B be taken in the following summer. In exceptional cases both may be taken together by special permission.

S 320. **Advanced Organic Chemistry.** Credit two or more hours. Laboratory practice at hours to be arranged. Professor ORNDORFF and Mr. CORNWELL.

The course in the preparation of organic compounds is here continued, the preparations, however, being more difficult, and requiring more skill and experience on the part of the student.

S 330. **The Coal Tar Dyestuffs.** Credit two to four hours. Laboratory practice. Hours to be arranged. Professor ORNDORFF and Mr. CORNWELL.

Various intermediate products used in the preparation of dyes are made and from these, representatives of the different groups of dyestuffs are prepared and studied.

S 340. **Methods of Organic Analysis.** Credit two or more hours. Laboratory practice, with occasional lectures. Hours to be arranged. This course presupposes courses in introductory organic chemistry and introductory quantitative analysis. Professor ORNDORFF and Mr. CORNWELL.

This course comprises the qualitative and quantitative analysis of pure organic compounds, and of such commercial products as alcohols, ethers, organic acids, glycerol, formalin, acetates, soaps, turpentine, rosin oils, etc.

S 375. **Introductory Organic Chemistry. Shorter Course.** Aliphatic compounds. Lectures and recitations. Daily, 9. *Morse* 119. Professor ORNDORFF and Mr. LACEY. Aromatic compounds. Lectures and recitations. Daily, 10. *Morse* C, during the latter half of the session only. Mr. CORNWELL and Mr. LACEY.

Required of students in the Department of Home Economics. Credit four hours for lectures and recitations.

Laboratory practice at hours to be arranged. Credit one or two hours. Mr. CORNWELL and Mr. LACEY.

This course is primarily designed for students preparing for the study of medicine, who are required to take the whole six hours.

S 405. **Introductory Physical Chemistry.**

A. Credit three hours. Lectures, daily, 8, and two other lectures at hours to be arranged. *Rockefeller*. Assistant Professor BRIGGS and Mr. ————. A systematic presentation of modern chemical theory. The subject matter includes: atomic and molecular theory; gases, liquids, and solids; the theory of solution; colloid chemistry and adsorption; reaction velocity, catalysis, and equilibrium in homogeneous systems; application of physicochemical principles to actual practice.

B. Credit three hours. Lectures, daily, 9. *Rockefeller*. Assistant Professor BRIGGS and Mr. ————. A continuation of Part A. The subject matter in-

cludes the phase rule and its applications; thermochemistry; electrochemistry; photochemistry; application of the principles of physical chemistry to actual practice.

S 410. Physical Chemistry Laboratory. A. Credit three hours. Laboratory practice, daily except Sat., 8-1. Assistant Professor BRIGGS and Mr. ———. Open to those only who have taken or are taking Course S 405 A or its equivalent. With the data obtained in the laboratory as a basis, detailed reports are written covering each of the following topics: calibration of volume-measuring apparatus; molecular weight determination by vapor density, boiling point and freezing point methods; vapor pressure; viscosity; distillation of liquid mixtures.

B. Credit three hours. Laboratory practice, daily except Sat., 8-1. Assistant Professor BRIGGS and Mr. ———. Open to those only who have taken or are taking Course S 405 B or its equivalent. The course is a continuation of Part A. The following topics are considered: dissociation; solubility; reactions; reaction velocity and catalysis; indicators; thermochemistry; diffusion; colloids and adsorption; photochemical reactions; phase rule studies of inversion points: solid-liquid, liquid-liquid, compounds.

S 465. Laboratory Practice in Physical Chemistry. Credit one to three hours. Laboratory periods to be arranged. Assistant Professor BRIGGS and Mr. ———

This course is designed to afford opportunity for special laboratory practice in physical chemistry, colloid chemistry, or electrochemistry.

S 195, S 295, S 395, S 495. Research. Credit one to six hours. Senior chemists, and others by special permission, may elect research in the fields of Inorganic, Analytical, Organic, or Physical Chemistry under the direction of some member of the staff of instruction.

For courses in agricultural chemistry see pages 61, 62 of this announcement.

S 180. Teachers' Course in Chemistry. Daily except Sat., 10. *Rockefeller C.* Credit two hours. Mr. MCKINNEY. Lectures, discussions, and conferences concerning the teaching of chemistry in the secondary schools.

DRAWING AND PAINTING

S 1. Color from Still Life. Daily except Sat., 8-10. *Franklin.* Assistant Professor STONE and Professor ADAMS.

Instruction will be given in one or more of the following media: oil, watercolor, pastel.

S 2. Outdoor Sketching. Daily except Sat., 2-4. *Franklin.* Assistant Professor STONE.

Sketching from nature in oil or in watercolor. Only those who have had previous work in one of these media will be admitted to this class.

S 3. Drawing from Antique. Daily except Sat., 2-4. *Franklin.* Professor ADAMS.

Instruction will be given in charcoal drawing from casts.

ECONOMICS

The following courses are designed to meet the needs of three classes of students in the Summer Session: (1) those desiring regular college credit for general

economics; (2) students with special interests in economic subjects; (3) students seeking broad preparation for the teaching of economics in secondary schools. For the first group, Course S 1 covers the subject matter usually included under elementary economics. For Cornell students Course S 1 satisfies the economics requirement in the College of Engineering and will also serve in lieu of Course 51 as a prerequisite for admission to various advanced courses in Economics. Graduate students wishing to pursue special investigations will be afforded assistance by members of the Summer Session staff of instruction, and by other members of the Department of Economics of the University who may be in residence in Ithaca during the summer.

S 1. Principles of Economics. Credit four hours. Twice daily except Sat., 11 and 12. G. S. 142 and 245. Mr. KENDRICK and Mr. KEEZER.

A general introduction to economics, covering the fundamental principles of value and the distribution of wealth, together with the elements of money and banking.

S 2. Labor Problems. Credit two hours. Daily except Sat., 8. G. S. 242. Assistant Professor FURNISS.

A study of the conditions of labor as affected by the industrial development of modern society. Especial attention is given to the aims and tactics of organized labor; the types and programs of the labor unions; the legal status of the union program; and the effect of the labor movement on social welfare.

S 3. Industrial History. Credit two hours. Daily except Sat., 9. G. S. 242. Assistant Professor FURNISS.

A survey of the evolution of industry from the Industrial Revolution to the present day; the development of modern forms of organization and the effect of industrial changes on the welfare of society.

S 4. Introduction to Sociology. Credit two hours. Daily except Sat., 10. G. S. 124. Professor WEATHERLY.

Leading principles of the science with special emphasis on social forces. While the discussion is primarily concerned with laws and concepts, constant attention is given to their application to the practical problems of social organization. Lectures, discussions, and papers.

S 5. Population and Social Progress. Credit two hours. Daily except Sat., 11. G. S. 124. Professor WEATHERLY.

An outline of theories since Malthus, particularly with reference to the quality of population. The transition from natural selection to social control; changes in population types due to immigration; the proposals and the outlook of eugenics. Lectures and discussions. Opportunity for individual research.

S 6. Elements of Accounting. Credit two hours. Daily except Sat., 9. G. S. 264. Professor ENGLISH.

The theory of debit and credit in double entry bookkeeping: the classification of accounts; the construction and use of a simple accounting system; the preparation and interpretation of financial statements.

S 7. Corporation Finance. Credit two hours. Daily except Sat., 11. G. S. 264. Professor ENGLISH.

A study of the organization, administration, and regulation of corporations. Particular attention will be paid to the financial aspects of the subject.

EDUCATION

Courses S 1, S 2, S 3, and S 4, will be found especially helpful to college graduates who are preparing for examinations in professional subjects as outlined in the New York State Syllabus and Course of Study for the renewal of the College Graduate Certificate Limited. The State Department of Education will hold an official examination for such candidates at Ithaca, August 16 and 17.

Under certain conditions teachers may waive the state examination by completing an approved course of study in the Summer Session. Information regarding details of such a course may be had by consulting Professor R. H. JORDAN, Goldwin Smith Hall 121, either in person or by letter.

S 1. Educational Psychology. Credit two hours. Daily except Sat., 10. G. S. 256. Professor OGDEN.

A study of the learning process and its application to educational theory and practice; the original nature of man, reflex action and instinct; the acquisition of habits; attention, memory, association, and thinking; fatigue, individual differences, and social co-operation. The textbook used in this course will be Gordon's *Educational Psychology* supplemented by Ogden's *Introduction to General Psychology*.

S 1 a. Supplement to S 1. Credit one hour. Time to be arranged. G. S. 248.

For students in need of three hours' credit in the subject. Discussions, reports, and assigned readings.

S 2. Principles of Education. Credit two hours. Daily except Sat., 12. G. S. 256. Assistant Professor WRIGHT.

A study of education from the sociological point of view, the biological and psychological bases; the problem of aim; formal discipline; social and personal objectives; the studies and their functions; the administrative curriculum; especial reference is made throughout to secondary education.

Textbook: Inglis, *Principles of Secondary Education*.

S 2 a. Supplement to S 2. Credit one hour. Time to be arranged. G. S. 248

For students in need of three hours' credit in the subject. Discussions, reports, and assigned readings.

S 3. History of Education. Credit two hours. Lectures, recitations, and prescribed readings. Daily except Sat., 11. G. S. 256. Assistant Professor WAKEMAN.

The purpose of this course is to give an understanding of present educational values and practices through an historical consideration of their origin and development. Throughout the course, therefore, attempt will be made not only to outline the problems and their solutions, but to correlate education with the life and the social, psychological, and economic conditions of the times. Only such theories and practices as later proved themselves influential will be considered.

The topics treated are to a great extent those emphasized in the syllabus for the New York State Teachers' Certificate; education in primitive and barbaric societies; Greek and Roman education; the rise of the school as an institution; scholasticism, humanism, and realism; the rise of science; the 'psychological' movement; the origin and nature of specifically modern tendencies in education.

Textbook: Cubberley, *A Brief History of Education*.

S 3 a. **Supplement to S 3.** Credit one hour. Time to be arranged. G. S. 248.

For students in need of three hours' credit in the subject. Discussions, reports, and assigned readings.

S 4. **Secondary School Methods.** Credit two hours. Daily except Sat., 8. G. S. 256. Professor JORDAN.

A study of the principles underlying teaching in the secondary school; methods of class instruction; interest and effort; questioning; lesson assignment; lesson plans; class and school management; supervised study; socialized instruction; the project. The course will be adapted to the needs and interests of the class.

Textbook: Colvin, *An Introduction to High School Teaching*.

S 5. **High School Administration.** Credit two hours. Daily except Sat., 10. G. S. 120. Professor JORDAN.

A study of the principles basic to administration of the senior and junior high school; the course of study; principles of election; classification of pupils; use of intelligence and achievement tests; the principal as supervisor; building problems; selection and rating of teachers; schedule-making; problems growing out of the experience of the class. Briggs's *Junior High School* will be used as a basis for discussion in part of the course.

S 6. **Classroom Tests and Measurements.** Credit two hours. Daily except Sat., 11. G. S. 128. Assistant Professor WRIGHT.

Use of educational measurements and standard scales in the solution of typical educational problems; class and individual diagnosis in the light of achievement-tests; remedial measures following such diagnosis.

Textbook: Monroe, *Measuring the Results of Teaching*.

S 7. **Mental Measurements.** Credit three hours. Lectures, prescribed readings, and laboratory. Daily except Sat., 9. G. S. 256. Assistant Professor WAKEMAN. Laboratory, T Th, 2-4:30. G. S. 248. Mr. GILBERT.

The first half of this course furnishes a general introduction to the psychology and practice of mental tests. The lectures will deal with the historical development of tests; the principles underlying their formation and application; the single tests and the test systems; a detailed study of the principles and use of the Stanford Revision of the Binet-Simon Scale; a brief consideration of the measures of central tendency, variability, and correlation; the bearing of tests upon the problems of psychological theory (nature and distribution of intelligence, the correlation of abilities, etc.). The laboratory work is intended to give practice in administering tests, both to individuals and to groups.

The second half of the course will consider the use of the tests in schools for the diagnosis of defective and exceptional abilities; the causes, frequency, and consequences of mental deficiency; the social and educational treatment of defective, delinquent, retarded, superior, and psychopathic children.

Textbooks: Terman, *The Measurement of Intelligence*. Woodrow, *Brightness and Dullness in Children*.

Laboratory Manual: *Intelligence Tests and their Use*. (Twenty-first Year-book of the National Society for the Study of Education).

S 9. **Advanced Work in Education.** Hours and credits to be arranged. G. S. 248. Professor OGDEN and the other members of the staff.

As a prerequisite for this course one of the courses S 2, S 3, or S 7, or an equivalent, is necessary. The work may consist either of essays and reports upon some special topic, or of laboratory practice of an advanced grade. A seminary will be held if application is made by a sufficient number of advanced students.

S 10. Seminary in Public School Administration. M W, 2-4. Credit to be arranged. G. S. 248. Professor JORDAN.

A study of administration of state and city school systems, and of problems of evaluating and improving teaching and curricular offerings in the public schools; attention will be given to the problems of smaller cities and towns. This course is open to teachers of experience who have had some previous courses in education. Essays and reports will be required.

Visual Instruction

S 11. Visual Instruction. Credit two hours. Daily except Sat., 11. G. S. 134. Mr. ABRAMS.

The psychological basis for the use of visual aids in instruction; the relation of pictures to the imagination, to interest, and to effort; the fundamental distinctions between language and picture expression; the place and limits of each; essentials of the visual method; relation to particular studies; the equipment needed and how to use it; the extent to which the method may be used with profit; types of visual aids and the special value of each; standards for selection of pictures; how to read pictures. Demonstration lessons, conferences, criticisms of particular pictures, exhibits.

S 12. Visual Aids to Instruction. Credit two hours. Daily except Sat., 9. G. S. 134. Mr. ABRAMS.

This course is intended for those interested in the selection, organization, and distribution of visual aids to instruction and in the supervision and direction of their use, including producers, members of bureau staffs, principals of schools, supervisors, and librarians. Topics: educational and pictorial standards for selection (more technical than in course 1); accessioning, classifying, labeling, and filing; work of special bureaus of visual instruction, school systems, and libraries; practical schemes of distribution; aims and methods in supervision; discussion of truthfulness, authenticity, quality, expressiveness, and attractiveness as applied to pictures; criticisms of book illustrations; equipment needed.

This course will be adapted to the special needs of the persons taking it.

Teachers' Courses in High School Subjects

The following courses are offered for teachers desiring to study problems of instruction in different high school subjects. The courses are planned also to meet the requirements of the New York State Department of Education in the issuance of the College Graduate Life Certificate.

Teachers' Course in Chemistry. See Chemistry S 180, p. 18.

Teachers' Course in English. See English S 5, p. 27.

Teachers' Course in Geography. See Geography and Geology S 12, p. 33.

Teachers' Course in History. See History S 17, p. 35.

Teachers' Course in Latin. See Latin S 1, p. 36.

Teachers' Course in Mathematics. See Mathematics S 20, p. 37.

Teachers' Course in Music. See Music S 21, p. 38.

Teachers' Course in Physics. See Physics S 15, p. 41.

Teachers' Courses in Public Speaking. See Public Speaking S 3, S 9, p. 44.

Teachers' Courses in Romance Languages. See French S 31, p. 46; and Spanish S 30, p. 47.

The attention of teachers is also called to the courses in Rural Education (p. 69).

Training Course For Psychological Examiners

By recent legislative enactment of the State of New York, special classes for defective children must be formed whenever ten or more such cases are found in any school district. A similar law is operative in New Jersey, and like requirements are being made in other states. Not only is there a considerable consequent demand for teachers trained in the examination and instruction of defectives, but with the increasing recognition of the extent and importance of individual differences in endowment, there is increasing recognition of the usefulness of familiarity with the methods and interpretation of psychological examinations, not only for the mentally backward and subnormal, but also for the normal and supernormal, and in other fields than that of education.

To assist in meeting these various needs, the departments of Education and Psychology call special attention to courses in Introductory, Experimental, and Educational Psychology, and to the course in Mental Measurements. The latter has been expanded to give a thorough training in administration of tests, and in the evaluation and application of results. Students who wish to enter this course with a view to educational and field service, are advised to register for such additional courses in Psychology as may be helpful in providing an adequate understanding of psychological principles and methods of investigation. Advice in the selection of courses with regard to the individual needs of the student may be had by consulting Professor R. M. OGDEN, Goldwin Smith Hall 246, either in person or by letter.

ENGINEERING

The courses in engineering described below are equal in character to corresponding courses given in the College of Engineering during the regular session. They will be accepted for credit towards graduation by the several schools of the college as far as they apply to the prescribed work of the school concerned. Students in the College of Engineering who may desire to offer work done in the Summer Session toward graduation should consult the Director of the School in which they are regularly registered before registering in the Summer Session. Others may obtain full information concerning these courses by applying to the Secretary of the College of Engineering.

Shop Work

S 10. Machine Work. Instruction in the operation of various standard machine tools; use of measuring and hand tools; fitting and assembly. Daily, 8-11 or 9-12; daily except Sat., 2-5. Professor WELLS.

M.E. 300. Foundry. Moulding, core making, mixing, melting, and pouring of metals; use of molding machines for quantity production. Daily, 8-11 or 9-12; daily except Sat., 2-5. Mr. PATTERSON.

The course will be given only if a sufficient number enroll to justify the operation of the shop.

Drawing

S 3. Mechanical Drawing for Secondary Schools. M T Th F, 8-11 and 2-5. *East Sibley 206.* Assistant Professor TOWNSEND.

This course is designed for those who wish to teach mechanical drawing in secondary schools and for those who feel the need of a more complete knowledge of this subject to assist them in teaching shop work. Some of the topics covered are use of instruments, lettering, orthographic and isometric projection, inking, tracing, conventions, and working drawings. Students familiar with these topics may elect a more advanced course.

Students should be provided with a set of drawing instruments, an architect's scale, a 30°-60° and a 45° triangle.

S 4. Mechanical Drawing. M T Th F, 8-11 and 2-5. *East Sibley 206.* Assistant Professor TOWNSEND.

A course in drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, convention, working drawings.

Descriptive Geometry

S 10. Descriptive Geometry. Lectures, daily except Sat., 9. Recitations and drawing, daily except Sat., 10-12. *Lincoln.* Assistant Professor POND.

A study of the representation of lines, planes, surfaces, and solids, and their interrelations. Warped surfaces, tangencies, intersections, and perspective. The work is the same as that given in the regular C. E. courses 201 and 202; and the student will receive four hours of credit if he takes the whole course. A two-hour course that does not include perspective, and fulfills the requirements of course 312 of the Sibley School of Mechanical Engineering will also be given from 2-5 p. m., if there are students enough to make up an extra section. The morning and afternoon sessions make it possible to readjust the schedule so as to accommodate nearly all who may wish to take either course.

Mechanics of Engineering

The following courses in Mechanics of Engineering are open to students from other universities, subject to the same requirements for admission as are made for Cornell students. Classes are held in Lincoln Hall. See bulletin board, north end of main hall, first floor, at opening of the Summer Session for detailed schedule. See the *Announcement of the College of Engineering* for more detailed descriptions of courses 220, 221, 330, 331, 332.

S 20. Mechanics. Credit five hours. One section. Eleven recitations and two computing periods a week. Equivalent to C. E. 220. Open to students in Arts and to students in Civil Engineering who have conditions. Not open to Sibley students, who should register for course S 30.

S 21. Mechanics. Work and Energy and Mechanics of Materials. Credit five hours. Equivalent to C. E. 221. Eleven recitations and two computing periods a week. Prerequisite course 220 or the equivalent.

If not enough students register to form a section, credit equivalent to C. E. 220 or 221 may be obtained by possible combinations of S 30, S 31, and S 32.

S 30. Mechanics. Credit three hours. Two sections. Six recitations a week and two computing periods. Equivalent to Sibley 330. Open to students in Mechanical Engineering and Electrical Engineering under the prerequisites for Course 330. Not open to students in Civil Engineering if Course S 20 is given.

S 31. Mechanics of Materials. Credit four hours. Three sections. Nine recitations and two computing periods a week. Equivalent to Course 331. Prerequisite courses 220 or 330, or the equivalent. May be taken by students in Civil Engineering in conjunction with a part of S 32 to obtain a combined credit equivalent to C. E. 221.

S 32. Mechanics of Rigid Bodies. Credit three hours. One section. Six recitations and two computing periods a week. Equivalent to Sibley 332. Prerequisite 330 and 331 or the equivalent.

Rotary motion, work, energy, friction, and dynamometers; combined stresses, curved beams, built-in beams.

Hydraulics

240. Hydraulics. Credit four hours. Prerequisite courses 220, 221, or 330, 331. Five recitations and three computing periods a week. Six or more demonstration lectures are given in recitation periods. Daily except Sat., 10; M W F, 2-4.30. The Schools of Mechanical and Electrical Engineering will accept this course for 335. Assistant Professor WEBER.

Hydrostatics, including stability of gravity dams, immersion and flotation, gas volumes and pressures; flow of liquids through orifices, nozzles, Venturi meters, pipes, and over weirs; time required to fill and empty tanks and canal locks; simple, compound, branching, and looping pipes; elementary power calculations in common pumping and fire protection problems. Flow of water in open channels. Elementary consideration of modern water wheels.

Structural Engineering

C. E. 270. Structural Design and Bridge Stresses. Credit four hours. Lectures, recitations, computations, and drawing at hours to be assigned. *Lincoln* 14 and 29. Prerequisite C. E. 220, 221. Assistant Professor BURROWS.

One-fourth of the course includes structural detail, i. e., the design of a wooden roof truss and other timber joints. The remainder of the course includes dead load, live load, and impact stresses in simple bridge trusses due to uniform live panel loads, locomotive axle loads, and road roller loads.

C. E. 271. Structural Design. Credit three hours. Lectures, computations, and drawing. Daily, at hours to be assigned. *Lincoln* 14. Prerequisite C. E. 270. Assistant Professor BURROWS.

An elementary course in steel design. Complete design, detail drawing, bill of material, and estimate of weight of a steel roof truss, a through an a deck plate girder bridge.

C. E. 274. Bridge Design. Credit three hours. Computation and drawing, daily, at hours to be arranged. Prerequisite C. E. 271. Assistant Professor BURROWS.

Computations and drawing for the complete design of a riveted railroad bridge of six or seven panels, the stresses for which were computed in connection with the previous study of bridge stresses. The computations to determine the sections of all members and of pins, pin plates, splices, and other details as well as of con-

necting rivets are to be written up in systematically arranged reports. The drawing consists of general detail plans showing the location of all rivets as well as the composition and relation of all members and connections. The final reports are to give a full list of shapes and plates, and a classified analysis of weight for the span. Textbook: Merriman and Jacoby's *Roofs and Bridges*, Part III.

C. E. 280. **Concrete Construction.** Credit three hours. Daily, at hours to be arranged. Prerequisite courses C. E. 220, 221, 225, and 226. Assistant Professor URQUHART.

Concrete materials, properties of plain concrete, its making and deposition; elementary theory of reinforced concrete as applied to columns, rectangular beams, and slabs; T-beams and beams reinforced for compression; direct stress combined with flexure. Laboratory work includes the making and testing of columns and beams.

C. E. 282. **Reinforced Concrete Building Design.** Credit three hours. Daily, at hours to be arranged. Prerequisite course C. E. 280. This course may be substituted for C. E. 291. Assistant Professor URQUHART.

Design of a reinforced concrete flat-slab building and an investigation of various other types of floor systems for commercial buildings. Complete detail design for one building, including stairways, elevator shafts, penthouses, etc. Working drawings and steel schedules.

C. E. 283. **Reinforced Concrete Arch.** Credit three hours. Daily, at hours to be arranged. This course may be substituted for Engineering Design, Course 291f. Prerequisite course 280. Assistant Professor URQUHART.

The design of an arch of reinforced concrete and its abutments; investigations of the arch ring in accordance with the elastic theory (the live loading for maximum unit-stresses in the arch ring, as well as the direction and magnitude of abutment thrusts, being determined by the influence-line method). Computation and drawing.

ENGLISH

Courses S 1 and S 2 taken together will be considered the equivalent of the first term of Course 1 in the regular University session.

Courses in brackets are not given in the summer of 1923, but may be expected in the summer of 1924.

S 1. **Composition.** Credit two hours. Daily except Sat., 8. G. S. 177. Dr. SANDERS.

A practical drill intended for those who lack proficiency in writing; discussions of the elements and forms of discourse; frequent exercises, mainly expository; personal conferences at hours to be appointed.

S 2. **Introductory Course in Literature.** Credit two hours. Daily except Sat., 9. G. S. 164. Dr. SANDERS.

Primarily a study of five of The Idylls of the King: The Coming of Arthur, Lancelot and Elaine, The Holy Grail, Guinevere, and the Passing of Arthur; and of the first, fifth, sixth, and seventh books of The Ring and the Book; and supplementary reading in Tennyson and Browning.

S 4. **Advanced Composition.** Credit two hours. Daily except Sat., 11. G. S. 164. Professor STRUNK.

The planning, writing, and criticism of essays and of other exercises in composition, accompanied by a study of general principles of writing and of questions of

English usage. The work of the class will be supplemented by personal conferences. Open only to students who have had course S 1 or its equivalent.

S 5. Teachers' Course. Credit two hours. Daily except Sat., 10. G. S. 156. Professor NORTHUP.

Lectures, readings, reports, and discussions. Designed for those who are teaching or who expect to teach English in schools. The organization of the high school course in English; methods of treating the works named by the Conference on Uniform Entrance Requirements in English; the teaching of literature in general; supplementary reading for pupils and teacher; the use of the school library and the public library; stage productions; the place of language and grammar in the high school; problems of oral and written composition; the relation of composition to literature and to other subjects in the curriculum.

[S 6. **Nineteenth Century Poetry.** Credit two hours. Daily except Sat., 8. G. S. 160.

A study of the poetry of Wordsworth and of Coleridge.]

S 7. Nineteenth Century Poetry. Credit two hours. Daily except Sat., 8. G. S. 156. Assistant Professor FISKE.

A study and discussion of the most important poems of Byron, Shelley, and Keats.

[S 8. **Modern Prose.** Credit two hours. Daily except Sat., 11. G. S. 156.

The nature of prose, and the principles of structure and style; essays and extracts from the works of Stevenson, Pater, Ruskin, and Newman, or other nineteenth-century English authors.]

S 10. Shakespeare. Credit two hours. Daily except Sat., 9. G. S. 156. Professor STRUNK.

A study of a limited number of tragedies, including Hamlet and Macbeth, on the list of the College Entrance Examination Board—with stress upon the art of Shakespeare as a playwright.

S 11. American Literature. Credit two hours. Daily except Sat., 12. G. S. 156. Professor NORTHUP.

A study of the American poets of the nineteenth century with particular attention to Bryant, Poe, Whittier, Longfellow, Lowell, Holmes, and Emerson. Text: Page, *Chief American Poets*.

S 12. Victorian Literature. Credit two hours. Daily except Sat., 10. G. S. 164. Assistant Professor FISKE.

Lectures, readings, reports, and discussions of the leading characteristics and literary tendencies of the nineteenth century; the literary reflection of social changes; the relation of science and politics to literature; illustrative readings in the works of Tennyson, Browning, Arnold, Clough, Swinburne, Morris, Rossetti, with a glance at the novelists and essayists. Prerequisite course S 2 or its equivalent.

S 13. Play-Writing. Credit two hours. Daily except Sat., 10. G. S. 160. Professor SAMPSON.

A course in the technique of dramatic composition. Membership in the class is restricted to those who before June 15 satisfy the instructor of their ability by sending specimens of their dramatic writing. Address Professor M. W. Sampson, Goldwin Smith Hall, Ithaca, N. Y.

S 14. Modern Drama. Credit two hours. Daily except Sat., 11. G. S. 156. Professor SAMPSON.

An advanced course designed for those who have completed two or more college courses in English, or whose reading serves as an equivalent for freshman and sophomore work.

Reading and discussion of characteristic plays of some of the more important recent dramatists; consideration of the modern theatre; current theories of drama.

S 16. The English Language. Credit two hours. Daily except Sat., 9. G. S. 162. Assistant Professor MONROE.

A study of essential features in the growth and development of the mother-tongue. Among the topics considered are: language and grammar in general; some misconceptions about the life of language; the relationships of English; phonetics, with practical exercises; the English vocabulary; inflections; native resources and foreign influences; modern English grammar; syntax; disputed usages; the bearing of historical grammar on present forms and usages, spoken and written.

Recitations, lectures, collateral reading. The course does not require previous knowledge of Old or Middle English.

[S 17. Recent English Poetry. Credit two hours. Daily except Sat., 10. G. S. 164.

A critical study of the poetical work of Robert Bridges, Rudyard Kipling, W. B. Yeats, Thomas Hardy, Sir William Watson, Sir Henry Newbolt, John Masefield, Alfred Noyes, W. W. Gibson, and Francis Ledwidge. Consideration of other contemporary work, including the "new poetry" and the poetry of the War.]

S 18. Old English. Credit two hours. Daily except Sat., 12. G. S. 162. Assistant Professor MONROE.

This course is intended for students who, lacking the opportunity hitherto, now wish by earnest effort to acquire some knowledge of English in its early form. Lessons in grammar are followed as soon as possible by the reading of easy prose of the time of Alfred the Great.

The course may be taken by undergraduates; and, with additional reading, by graduates as a part of their work for the master's degree. The time of meeting may be changed to suit the convenience of the class.

S 19. English Literature. Credit two hours. Daily except Sat., 11. G. S. A. Professor GRIERSON.

Selected aspects of English and Scottish literature since Chaucer. Representative topics: Chaucer and his Scottish followers; the seventeenth century metaphysical poets; Milton's thought and art; Burke and the French Revolution; Robert Burns, with a glance at dialect poetry since Burns; Blake, Wordsworth, Byron, and Shelley, with the spiritual significance of the romantic revival; Tennyson and Browning as representing the Victorian age; recent poetry and drama.

Seminaries

Seventeenth Century Poetry, especially Donne and Milton. For advanced students. Hours and room to be arranged. Professor GRIERSON.

Middle English Literature. For graduates only. Hours and room to be arranged. Professor NORTHUP.

A study of some of the leading tendencies in late Middle English literature. The special topic for this session will be the life and works of Chaucer.

GEOGRAPHY AND GEOLOGY

Equipment and Purpose. The lecture rooms and laboratories are in McGraw Hall. It is the purpose in this department to meet, primarily, the needs of teachers in grammar schools, high schools, normal schools, and colleges. A second aim is to provide courses of practical and cultural value to college students. The work embraces lectures, laboratory, and field instruction in physical, cartographic, commercial, and regional geography, and in the elements of geology; also educational methods in geography.

The environs of Cornell University are rich in phenomena of geographic and geologic interest. Field excursions, consequently, are made an especially important part of the work of this department in the Summer Session.

The laboratories are well equipped with apparatus and illustrative material for instruction. This material includes teaching and reference collections of minerals, rocks, fossils, maps, photographs, models, and more than five thousand lantern slides.

Note on Additional Courses. The attention of prospective students in the Summer Session who are especially interested in geographic and geologic studies is invited to courses given in other departments, courses which afford opportunities for additional instruction in these subjects.

Meteorology and Climatology. Lecture and laboratory courses in the Summer School of Agriculture. See p. 66.

Astronomy. See p. 15.

Visual Instruction. Lectures, demonstration, exhibits.

Visual Aids to Instruction. Sources, selection, organization.

These courses, since attention will be given to visual instruction in geography and geology, will be valuable for those who teach or who are planning to teach either of these subjects. See p. 22.

Lecture Courses in Geography and Geology

S 1. Physical Geography. Credit two hours. Daily except Sat., 9. *Geological Lecture Room, McGraw Hall* (first floor, south end). Professor VON ENGELN.

An introductory course in physical geography, including discussion of the origin and form of the continents; the uplift and denudation of the land; the functions of the atmosphere, ground water, streams, and glaciers; the glaciation of North America; the influence of geographical environment upon plant and animal life and man's response to his physical surroundings.

The lectures in physical geography are fully illustrated by lantern slides and by wall and globe maps. Students registering in this course are advised to take also the related courses S 8 and S 10.

Entrance Credit for Physical Geography to Cornell University. To secure entrance credit ($\frac{1}{2}$ unit) in Physical Geography it is required that the student

attend, complete all required work, and pass the examinations in courses S 1, S 8 and S 10.

S 2. Commercial Geography. Credit two hours. Daily except Sat., 11. *Geological Lecture Room.* Professor VON ENGELN.

Consideration of the nature, variety, and importance of geographical environment and of natural resources as referred to national coherence and organization, the development of commerce, and the distribution of industries. Lectures and study of texts. The student should gain through this course a broad understanding of the geographic factors that are fundamental to such national problems as conservation, prosperity of different communities, domestic and foreign trade, location and growth of cities.

S 3. The Geography of Europe. Credit two hours. Daily except Sat.; 8. *Geological Lecture Room.* Assistant Professor WILLIAMS.

A regional study of Europe; special emphasis on the northwestern countries of Europe; geographic influences in the World War; discussion of problems which are facing the countries of Europe in relation to natural resources and other geographical factors.

S 4. Geographic Influences in American History. Credit two hours. Daily except Sat., 10. *Physical Geography Laboratory.* Associate Professor BRATTON.

A study of the influence of geographic conditions on the course of American history; a comparison of the importance of such geographic conditions with one another and with non-geographic factors: discussion of the geographic influences will be based on systematic and intensive study of the regional geography of the areas involved.

S 5. Geology. Credit two hours. Daily except Sat., 10. *Geological Lecture Room.* Associate Professor MONNETT.

An introductory course in geology, consisting of lectures and assigned readings upon the following topics: origin of the earth; geologic history of the earth; materials of the earth's crust and their arrangement, as well as the forces modifying them; vulcanism, earthquakes, and similar phenomena; development of life on the earth.

The lectures will be illustrated with lantern slides, models, maps, and specimens. Students registering for this course are urged to take the laboratory Course S 9 and, if possible, Course S 10.

S 6. Mineral Resources. Credit two hours. Daily except Sat., 8. *General Geology Laboratory.* Associate Professor MONNETT.

A course in which the principal mineral resources both metallic and non-metallic of the United States will be discussed with reference to the following points: distribution, mode of occurrence, uses, relative importance, rank of the United States among nations of the world in production, and the influence of the various deposits upon the development of the regions in which they occur.

An exceptionally complete collection of specimens is available as illustrative material for this course.

S 7. Latin America. Regional and Commercial Geography. Credit two hours. Daily except Sat., 11. *Physical Geography Laboratory.* Assistant Professor WILLIAMS.

This course is intended to present systematically the geographic conditions relating to the interdependence of the United States and the lands which lie to the

south, in commerce and in other contacts, as they now exist and as they promise to develop. It includes discussion of the physiographic and climatic provinces of the South American continent and of the lands adjacent to it, including Mexico and the West Indies. The natural resources of these regions and their development will be treated with special reference to export and import possibilities. The characteristics, political and social organization, of the peoples will also be considered.

Laboratory and Excursion Courses in Both Geography and Geology

S 8. Physical Geography, Laboratory Course. Credit one hour. T Th, 2-4. *Physical Geography Laboratory.* Mr. STUCKEY.

The members of this class will make a systematic study of the physiographic regions of the United States, using contour maps, models, and the experimental laboratory of the department in a laboratory study of the subject. By such study of the topographic, regional, and life relationships (human, animal, and plant) the geography of the United States will be correlated and presented as an orderly whole. The course will prove of worth to grade teachers of geography who wish to obtain a broader basis for their work in the subject as well as for those who expect to teach geography in the high schools.

A laboratory fee of \$1 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance.

S 9. Geology, Laboratory Course. Credit one hour. W F, 2-4. *General Geology Laboratory.* Mr. STUCKEY.

This course is designed to supplement course S 5. A study will be made of the more common structural phenomena; of the interpretation and uses of geological maps; of characteristic life forms developed in different geologic periods; and of the more common rocks and minerals. Short field excursions will be made to collect both rock specimens and fossils.

A laboratory fee of \$1 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance.

S 10. Geography and Geology Field Course. This course should be elected by all those registering in Course S 1 or S 5 and is required of all those who desire entrance credit in physical geography. With courses S 1 and S 8 it affords a comprehensive course in physical geography; with courses S 5 and S 9 it will give a similarly broad training in elementary geology, as the dynamic phases of geology are emphasized on the excursions. Mimeographed outlines of the excursions are to be secured by each student desiring credit.

Those desiring University or entrance credit must take field notes and hand in written reports. Excursions 1, 2, 3, 5, 6 are required of all students in the course, and in addition for one hour's credit they must make either 10, or two of 7, 8, and 11.

Meeting place and time announced in mimeographed outlines or by bulletin. Meet for first excursion, Monday, July 16, at East Ithaca Station, 2.00 p. m. Excursions 1-6, Monday afternoons; 7, 8, 11, all day Saturday; 10 starts on Saturday. On the excursions to which a cost is attached, persons wishing to go must register at the department and secure tickets in advance of the date of the trip.

The longer excursions will be under the general charge of Professor VON ENGELN

and Mr. STUCKEY, with the co-operation and assistance of the other members of the instructing staff. On the excursions stops will be made at points of interest, explanations made, questions asked, and discussion invited.

Outline of Excursions—Course S 10

Monday Afternoons

1. **Eagle Hill.** To become acquainted with the lie of the land about Cornell, to learn the place names of the broader physiographic features, studying en route processes of weathering, and, at the summit, the maturely dissected plateau. The top of the hill is a vantage point from which a good view of the lake and the land for miles to the north, east, and west may be had. July 16.

2. **Fall Creek and Deadhead Hill.** To study the origin and nature of sedimentary rocks, also processes of erosion, transportation, deposition, and cementation. An intimate view of one of the large gorges and its especial features, particularly Ithaca Falls. July 23.

3. **Shore of Cayuga Lake.** To study shore-line phenomena, joint planes, bedding, and stalactite formation. A walk for several miles along the east shore of the Lake. Probably a return by trolley. July 30.

5. **Terminal Moraine.** North Spencer. By train or auto-truck. To study a massive morainic loop, the basin in which the former ice tongue rested, and the outwash deposits and overflow channels to the south. Truncated valley sides due to glacial erosion. The most striking examples of glacial phenomena in the Cornell region. August 6.

6. **Six Mile Creek.** To study the effect of glaciation on a stream course. Relations to water supply and power development. A climb into and walk through one of the gorges in Six Mile Creek and an interpretation of its complicated physiographic history. August 13.

All-day Excursions

7. **Taughannock Gorge and Falls.** By auto-truck. To study the Inlet Plain, its reclamation, the Barge Canal terminal, the position and succession of the Devonian strata along the lake shore and the deep gorge and falls of Taughannock, one of the highest straight falls east of the Rockies. Luncheon at the foot of the falls. July 21.

8. **Enfield Gorge and Falls; and Connecticut Hill.** By auto-truck. To study the relations of preglacial and hanging valleys and the postglacial and interglacial gorges, their origin and features. Joint-plane guidance of stream courses. A ride to the head of the gorge, climb through it to the crest of Lucifer Falls. Enfield is perhaps the most picturesque and wildest of the gorges in the Cornell region. A ride to the top of Connecticut Hill, the highest point in the region. July 28.

Longer Excursions

10. **Niagara Falls and Gorge.** By train. Overnight at Niagara Falls. August 4. Open to all students in the Summer Session.

All the important scenic features of Niagara Falls and Gorge are visited and their physiographic history interpreted. As a whole these phenomena constitute a striking record of some of the most interesting chapters in the geologic and physiographic history of North America. Before the trip a special meeting of

those interested will be held in the Physical Geography Laboratory, when the relations of the different places will be explained and illustrated by a large scale relief model of the Niagara region. Students are advised to send to Director U. S. Geological Survey, Washington, D. C., for a copy of Niagara Folio, No. 190, in octavo form; cost, fifty cents in coin or money order.

11. Watkins Glen. By auto-truck. August 11. Open to all students in the Summer Session.

Watkins Glen is considered one of the most beautiful scenic spots in the country. It has been secured for a State park by New York and all parts of it made accessible. The excursion party will study the gorge, its pot holes and falls in detail; and consider its relations to the Seneca Lake Valley in comparison with the conditions at Ithaca as related to the Cayuga valley. Ride across the dissected upland country to the south and west between Ithaca and Watkins.

S 11. Cartography. Credit two hours. M W F, 8 to 10. *Physical Geography Laboratory.* Associate Professor BRATTON.

A course in the principles of map-making, including theory and practice in the construction and use of maps; the merits and faults of the more important map projections; the characteristics essential to maps for various purposes; the use of graphs in presenting statistical material; methods and devices used in making graphs. The study is designated to lead to greater readiness and proficiency on the part of teachers and students in the presentation and interpretation of geographical facts graphically expressed.

S 12. Teachers' Course. Principles, content, and methods for effective teaching of grade school and secondary school geography. Credit one or two hours. Open only to teachers and those planning to teach. Daily except Sat., 12. *Geological Lecture Room.* Associate Professor BRATTON and Assistant Professor WILLIAMS.

A course consisting of a series of lectures and demonstrations, given by Professors Bratton and Williams in alternation, on announced topics. In general Professor Bratton will present grade school subjects, Professor Williams secondary school topics. Teachers who are interested only in one phase may take that part of the work only for one hour of credit. Teachers are invited to write to either professor (addresses pp. 4, 7) before June 1, suggesting topics they desire to have emphasized or subjects they wish to see included.

GERMAN

S 1. First Year German. Credit four hours. Oral training, grammar, composition, reading. Daily except Sat., 8 and 12. G. S. 183. Professor POPE.

Entrance credit, one unit.

After successfully completing this course, students can, by supplementary reading during the summer, prepare themselves for the fall entrance examination in second year German.

S 3. Third Year German. Credit four hours. Oral training, grammar, composition, reading. Daily except Sat., 8 and 12. G. S. 190. Professor BOESCHE.

Entrance credit, one unit (third unit). Prerequisite two years of high school German or its equivalent.

S 4. Rapid Reading. Credit two hours. Daily except Sat., 9. G. S. 183. Professor BOESCHE.

Modern German literary prose texts will be read, translated, and discussed.

S 5. Lyric and Ballad Poetry. Credit two hours. Daily except Sat., 10. G. S. 177. Professor POPE.

The development of German lyric poetry from the Middle High German period to the present. Especial attention given to a literary appreciation of modern lyrics and ballads. Some time will be devoted to a study of German lyrics and ballads in the settings of modern German composers.

German Lectures and Readings. A series of lectures and readings in German will be given under the auspices of the Department of German on evenings to be announced.

GOVERNMENT

S 1. American Government. Credit two hours. Daily except Sat., 8. G. S. 245. Assistant Professor SABY.

A study of American Government, national and state, showing the historical development of our political institutions, more particularly their practical operation in meeting the present-day problems of our democracy.

S 2. City Government. Credit two hours. Daily except Sat., 10. G. S. 245. Assistant Professor SABY.

A general survey of city government and of city problems, such as public utilities, health and welfare, education and Americanization, city planning.

HISTORY

S 1. Roman History. Credit two hours. Daily except Sat., 11. G. S. 225. Professor BOAK.

This course will be a general survey of Roman History from the earliest times to the fall of the Roman Empire. Although the main emphasis will be laid upon political history, the social, economic, and religious movements will also be discussed. Lectures, collateral readings, and discussions.

S 2. The Hellenistic Age. Credit two hours. Daily except Sat., 12. G. S. 225. Professor BOAK.

This course will be a study of Greek History and Civilization from the time of Alexander the Great to the absorption of the Greek world in the Roman Empire. Lectures, collateral reading, discussions.

[S 3. **Modern European History.** The history of Europe since 1815]. Not given in 1923.

[S 4. **The French Revolution.**] Not given in 1923.

S 5. Modern European History. Credit two hours. Daily except Sat., 10. G. S. 242. Acting Assistant Professor ANDREWS.

A general treatment of the social and political history of Europe from the sixteenth century to 1815. Lectures and assigned readings.

S 6. The Napoleonic Era. Credit two hours. Daily except Sat., 11. G. S. 242. Acting Assistant Professor ANDREWS.

A study of the career of Napoleon, 1795-1815. His work is considered in its French and European aspects, with special attention to the reorganization of the French government. A reading knowledge of French will be of advantage. Lectures, assigned readings, and reports.

S 7. English History. Period of Lancaster, York, and Tudor. 1399-1603. Credit two hours. Daily except Sat., 9. G. S. 177. Professor BALDWIN.

A general course covering the period of transition from medieval to modern times. After a preliminary survey of the monarchy, parliament, and aristocracy of the fifteenth century, attention is given to the governing institutions, the intellectual and social movements during the age of the Renaissance and of the Reformation. Lectures, collateral reading, and discussions.

S 8. England in the Eighteenth Century. 1688-1815. Credit two hours. Daily except Sat., 12. G. S. 177. Professor BALDWIN.

A study of the modern constitution and political parties, with special attention to colonial policies in the light of the literature of the period. The subject affords a natural background for American History. Lectures and topics for special reading.

S 11. American History. The expansion of the United States across the Alleghany Mountains, 1750-1848. Credit two hours. Daily except Sat., 8. G. S. 234. Professor BRETZ.

This course deals with the exploration of the trans-Alleghany country, the movement of population into the West, Indian wars and relations with foreign powers on the frontier, territorial acquisitions, land policy, industrial development of typical communities, and in general with the social life of the new communities between the Alleghanies and the Mississippi. The plan is to supplement in some detail the customary treatment of American History and to emphasize the characteristic features of westward expansion.

S 12. American History. The Period of Civil War and Reconstruction, 1846-1875. Credit two hours. Daily except Sat., 10. G. S. 234. Professor BRETZ.

Special attention is given to new historical literature, biographies, memoirs, and published source material. The problems of the decade before the war, of the war, and of reconstruction are treated in the light of the present. The controversy over slavery is followed to its conclusion and attention is paid to the new national and industrial life created by the war. The problems of reconstruction and the political results of the policy of reconstruction are discussed in some detail.

American History. Seminary. Sat., 9-11. For students qualified for research. G. S. 235. Consult Professor BRETZ.

S 17. Contemporary History and its teaching in the secondary schools. Credit two hours. Daily except Sat., 9. G. S. 234. Professor HICKMAN.

This course deals with the history of Europe since the war. The topics studied are the Peace Treaty; the conferences of the premiers; the conferences of the ambassadors; the League of Nations; England; France; Italy; Germany; Austria; Hungary; Czechoslovakia; Jugoslavia; and Poland. Both in method and in content the course will be useful to teachers in secondary schools, especially such as teach the courses in world history prescribed by the new history syllabus of the University of the State of New York.

HYGIENE

S 11. Hygiene. Credit two hours. Daily except Sat., 8. *Stimson Histology Lecture Room.* Dr. SMILEY.

This is an informational course designed to treat in a general way personal and community hygiene and in a more special way the hygiene of the school child and the school group. The course will be carried on by means of lectures, charts, and frequent quizzes, and an attempt will be made to compensate for the wide scope of the subject by limiting the discussion to those aspects which will be of particular interest or importance to the school teacher.

LATIN

S 1. The Objectives and Technique of Latin Teaching in Secondary Schools. For teachers and those preparing to teach Latin in high or preparatory schools. Daily except Sat., 11. G. S. 120. Credit two hours. Dr. JEFFORDS and Professor DURHAM.

A study of the Classical Survey and an evaluation of the objectives proposed by the Investigating Committee of the American Classical League, including a consideration of the means and methods of attaining those objectives in classroom practice. Some special problems will also be considered: pronunciation of Latin; reading of Latin verse; chapters in Latin syntax.

S 2. The Three-Year Comprehensive Latin Requirements for College Entrance. Credit four hours, or the third unit of entrance Latin. For students who have not completed the full college entrance requirements, and for others who wish to review the essentials. Ten hours a week, daily except Sat., 8 and 12. G. S. 120. Dr. JEFFORDS.

A resumé of the paradigms, vocabulary, and syntax required in the Three-Year Comprehensive College Entrance Examination, together with an intensive study of the oration *De Imperio Pompei*, and daily exercises in Latin Composition.

This course covers the requirements of the third year of high-school Latin (entrance credit, one unit, third year Latin).

S 3. The History and the Development of the Latin Language, with particular reference to the sounds, flexions, vocabulary, and syntax of Vulgar Latin. Primarily for graduate students, candidates for the Master's degree. Daily except Sat., 9. G. S. 128. Credit two hours. Professor DURHAM.

S 4. Plautus and Terence. Interpretation of selected plays; the language and the metres of Plautus. Daily except Sat., 10. G. S. 128. Credit two hours. Professor DURHAM.

NOTE: Those who wish to begin their candidacy for the degree of Master of Arts are requested to correspond in advance with Professor Durham and to bring with them at the opening of the Summer Session such credentials of undergraduate work leading to the degree A.B., as will entitle them to admission to the Graduate School.

MATHEMATICS

In addition to the courses noted below, each teacher will have a daily office hour for consultation with students. It is urged that this opportunity be utilized by all concerned.

In the following list, courses S 1 to S 7 (2) are the equivalent of those having the same numbers in the *Announcement of the College of Arts and Sciences* for 1922-1923.

Courses S 1, S 2, S 3 are planned for those teachers in the secondary schools

who wish to review these subjects. They are equivalent to the advanced entrance requirements of Cornell University and of the College Entrance Examination Board. They presuppose a ready knowledge of elementary algebra (through quadratic equations) and of plane geometry. University credit for S 1, S 2, S 3, S 4, S 6, three hours each.

Students taking S 5, S 7 (1), S 7 (2) are requested to take no other University work during the session without special permission.

University credit for S 5, S 7 (1), S 7 (2), five hours each.

S 1. **Solid Geometry.** Daily, 11. *White* 5. Assistant Professor CRAIG. (Office hour, 9, *White* 4.) *White* 25. Mr. CAMPBELL. (Office hour, 10, *White* 22.)

S 2. **Advanced Algebra.** Daily, 9. *White* 1. Assistant Professor GILLESPIE. (Office hour, 11, *White* 3.) *White* 6. Assistant Professor WILLIAMS. (Office hour, 11, *White* 3.) *White* 25. Mr. CAMPBELL. (Office hour, 10, *White* 22.)

S 3. **Trigonometry.** Daily, 10. *White* 28. Professor SHARPE. (Office hour, 11, *White* 29.) *White* 6. Assistant Professor WILLIAMS. (Office hour, 11, *White* 3.)

S 4. **Analytic Geometry.** Daily, 9. *White* 28. Professor SHARPE. (Office hour, 11, *White* 29.) *White* 21. Dr. ROBISON. (Office hour, 11, *White* 23.)

S 5. **Differential Calculus.** Daily, 8 and 11. *White* 10. Assistant Professor CARVER. (Office hour, 9, *White* 12.) *White* 6. Assistant Professor HURWITZ. (Office hour, 9, *White* 8.) *White* 27. Dr. REED. (Office hour, 9, *White* 29.) *White* 9. Mr. MORSE. (Office hour, 9, *White* 12.)

S 6. **Integral Calculus.** Daily, 10. *White* 1. Assistant Professor GILLESPIE. (Office hour, 11, *White* 3.) *White* 21. Dr. ROBISON. (Office hour, 11, *White* 23.)

S 7. (1). **Analytic Geometry and the Calculus.** (First term's work.) Daily, 8 and 11. Given only if enough students register for the course. Apply to Professor SHARPE, *White* 29.

S 7. (2). **Differential and Integral Calculus.** (Second term's work.) Daily, 8 and 11. *White* 2. Assistant Professor OWENS. (Office hour, 9, *White* 4.)

S 20. **Teachers' Course.** Credit two hours. Daily except Sat., 11. *White* 24. Professor SNYDER. (Office hour, 10, *White* 26.)

The course will comprise selected topics in the subjects of secondary school mathematics, including constructions by ruler and compass and the solution of equations. The mutual dependence of algebra and geometry in the solution of problems will be emphasized.

Advanced Courses

S 62. **Projective Geometry.** Credit three hours. Daily, 9. *White* 24. Professor SNYDER. (Office hour, 10, *White* 26.) The principles underlying projective forms of the first and second degrees will be developed. Although no knowledge of mathematics beyond plane geometry will be presupposed, additional training is highly desirable.

S 42. **Analysis.** Credit three hours. Daily, 10. *White* 5. Assistant Professor CRAIG. (Office hour, 11, *White* 3.) A knowledge of the calculus is presupposed. The content of the course will vary from year to year, according to the needs and desires of the students. Correspondence from possible applicants for the course will be welcome. The subjects to be treated will generally be

selected from the following list: elementary differential equations, theory of limits and logical foundations of the calculus, theory of point-sets, infinite series, theory of functions of a complex variable.

Reading and Research Courses

In addition to the preceding courses, the teachers of mathematics offer the following opportunities to graduate students. Instruction will consist of conferences by appointment, direction of reading, and proposing definite problems for research.

Algebraic Curves and Surfaces. Problems in correspondence and birational transformations. Professor SNYDER.

Applied Mathematics. Problems in hydrodynamics. Heat, electricity, and elasticity. Professor SHARPE.

Foundations of Geometry and Problems in Synthetic Geometry. Assistant Professors CARVER and OWENS.

Functions of a Real Variable, Point-sets, Calculus of Variations. Assistant Professor GILLESPIE.

Advanced Analysis. Problems in the theory of functions, differential equations, and integral equations. Assistant Professor HURWITZ.

Functions of a Complex Variable. Assistant Professor CRAIG.

Algebraic Invariants. Assistant Professor WILLIAMS.

MUSIC

S 10. Harmony. Credit two hours. Daily except Sat., 10. *Sage Chapel.* Assistant Professor QUARLES.

A course dealing with the construction and interconnection of triads and chords of the seventh.

S 14. Musical Appreciation, Form, and Design. Credit two hours. Daily except Sat., 12. *Barnes Hall.* Mr. KROEGER.

A course in musical analysis, including form and design, and furnishing a rational basis for the appreciation of musical masterpieces of all schools.

S 18. History of Music. Credit two hours. Daily except Sat., 11. *Barnes Hall.* Mr. KROEGER.

The historical growth and development of music to the present time.

S 20. Music in the Elementary Schools (Grades I to VI). Credit two hours. Daily except Sat., 8. *Barnes Hall.* Professor GEHRKENS.

An introduction to the general problem of school music: its value as an educational subject; various types of objectives; principles underlying the methods in current use; practical suggestions for the simplification of procedure.

S 21. Music in Junior and Senior High Schools (Grades VII-XII). Credit two hours. Daily except Sat., 9. *Barnes Hall.* Professor GEHRKENS.

Various problems relating to music in the high school will be taken up. Among these will be: the problem of teaching music in the junior high school; instrumental music; the high school chorus and its problems; theory courses; appreciation classes; credit for practical music; glee clubs. Lectures, textbook assignments, supplementary reading.

Chorus. The Department of Music will organize and maintain a choir for the service in Sage Chapel at 11 o'clock each Sunday morning during the Summer Session. The individual tests for this choir will be held in Sage Chapel on Monday

July 9 from 9:30 to 12:30 and 2:30 to 5:00. The rehearsals will be held on Thursday at 5 o'clock and on Sunday at 10. All students having voices and desiring to sing are urged to become members of this choir.

PHILOSOPHY

The courses are intended to be of general rather than of technical interest, and may be taken by all students. Candidates for the degree of Master of Arts who have chosen philosophy as a major or a minor subject will find it desirable to take some of these courses as a basis and preparation for more advanced study. Such students will be given individual guidance in their reading.

S 1. Philosophical Ideas in Nineteenth Century Literature. Credit two hours. Daily except Sat., 9. G. S. 225. Professor ALBEE.

This course does not presuppose previous acquaintance with philosophy. After considering the general tendency of eighteenth century thought and the movement inaugurated by Rousseau, the course will deal with the interpretations of life offered by well-known authors of the nineteenth century, English, Continental, and American, and the relation of such interpretations to the recognized tendencies of contemporary philosophy.

S 2. Introduction to Philosophy. Credit two hours. Daily except Sat., 8. G. S. 225. Professor CUNNINGHAM.

The purpose of this course is to acquaint the student with the general method of philosophy and to discuss in an elementary way some of the more important problems now in debate. As time permits the following topics will be considered: science and philosophy; the nature and development of knowledge; the problem of truth; the nature of mind; vitalism and mechanism; the concept of evolution. Lectures, discussions, and assigned readings.

S 3. The Development of Modern Philosophical Thought. Credit two hours. Daily except Sat., 11. G. S. 225. Professor ALBEE.

Only the most important philosophers of the modern period will be dealt with, but the attempt will be made to connect the development of modern philosophy with literary, scientific, and social movements.

S 5. Philosophies of Life. Credit two hours. Daily except Sat., 10. G. S. 225. Professor CUNNINGHAM.

An outline survey of typical philosophies of life. The various forms of hedonism; the self-realization theories, and radical individualism such as that emphasized by Nietzsche will be studied and compared. Practical applications in different fields will be suggested. Frequent reference to the classical theories will be made, but no systematic knowledge of these theories is presupposed. Lectures, discussions, and assigned readings.

PHYSICAL EDUCATION

Swimming.

Instruction in swimming and life saving for individual training and for teaching will be given at hours to be arranged for each applicant by appointment.

For this instruction a special charge of ten dollars is made.

For women, *Sage College Gymnasium*. 9-12 a. m., 2:30-5 p. m. For men, *Armory Gymnasium*, by appointment. Mr. GÉLAS.

Equitation.

Daily except Fri. and Sat., 8, 9. Major CHRISTIAN and First Sergeant JENSEN of the Field Artillery Detachment, Cornell University.

For this instruction a special charge of ten dollars is made.

Courses in Equitation are open only to students regularly enrolled in the Summer Session.

S 1a. Elementary Class (Men). Practical equitation and horsemanship; the seat; the aids; work on the track; posting; cross-country riding.

S 1b. Elementary Class (Women). A course more elementary than S 1a, yet covering much the same ground. Selected mounts.

S 1c. Advanced Class. Hours to be arranged. For those who have had experience in riding. The seat; the rein; leg aids; exercises on long lines with and without stirrups; exercises on the circle; posting; the walk, trot, and gallop; jumping; cross-country riding; the care, conditioning, and training of horses.

PHYSICS

Teachers may enter any course that they are prepared to pursue with profit and are entirely at liberty to take portions of courses if such an arrangement is to their advantage.

Those who have not had college physics are advised to take course S 3.

S 3. Introductory Experimental Physics. Credit six hours. Lectures daily, 8; recitations, daily 9; quiz, M, 10-12. *Rockefeller* A. Assistant Professor HOWE. Laboratory, three two-hour periods a week. Section A, M, 2-4 and T Th, 10-12; Section B, W F, 10-12 and Th, 2-4. *Rockefeller* 220. Messrs. McCORKLE and ZELLER.

This course is intended to furnish a basis for all following courses as well as to give a fairly complete survey of general physics. Teachers and others familiar with the elements of the subject may find the course useful and instructive. The lectures are accompanied by experimental demonstrations. Kimball's *College Physics* will be used for reference.

S 4. Properties of Matter and Sound. Credit two hours. Class work. A knowledge of introductory physics such as may be obtained in a first course in college physics will be presupposed. Daily except Sat., 12. *Rockefeller* 105. Assistant Professor KENNARD.

S 7. General Physics. Credit three hours. Recitations and problems. Prerequisite Physics 2 or its equivalent and trigonometry. Six recitation periods and one quiz period a week. Recitations, daily 12; quiz period, M 8, or as arranged. *Rockefeller* 107. Assistant Professor COLLINS.

S 10. Physical Experiments. Credit two hours. For teachers of elementary physics and for others wishing a greater familiarity with laboratory work. T Th, 10-12, and M W F, 2-4:30. *Rockefeller* 320. Assistant Professor COLLINS.

A general laboratory course of the study of the fundamental physical laws and constants, partly from the qualitative, partly from the quantitative point of view. The work may be varied to suit the interest of the student, since the instruction is in all cases individual. This course presupposes a knowledge of introductory physics but may in some cases be taken at the same time with Physics S 3.

S 11. Heat, Light, and Electricity. Credit three hours. Recitations. Theory and problems. It is recommended that Physics S 14 be taken simultaneously with Physics S 11. Prerequisite Physics S 3 and S 7 or their equivalent and the differential and integral calculus. Six recitation periods and one quiz period a

week. Recitations, daily, 8; quiz period, M 12, or as arranged. *Rockefeller* 106. Assistant Professor BIDWELL.

S 14. Physical Measurements. Credit one to four hours. Primarily for teachers and students who wish a thorough introduction to the theory and methods of physical measurements and observations either as a preparation for graduate study or as an extension of previous work in physics. Prerequisites, the equivalent of eight hours of college physics and a knowledge of the elements of calculus. One to four three-hour periods a week. M W F, 9-12 (or 10-1 by special arrangement) and T Th, 2-5. *Rockefeller* 252. Assistant Professor BIDWELL and Mr. NORTHROP.

The methods of setting up and adjusting apparatus, the study of sources of error and their elimination, methods of computation, the interpretation of results, both analytically and graphically, have special emphasis. The instruction is individual and the topics covered may be adjusted to meet the needs of the student.

S 15. Teachers' Course. Daily except Sat., 9, with one or more additional hours for studying laboratory teaching. *Rockefeller* 108. Mr. ZELLER.

Lectures, discussions, and conferences with emphasis upon the selection of experiments for demonstration and laboratory work and upon the applications and illustrations of physical principles.

The sequence of courses outlined below is intended to run through three summer sessions. The schedule for the next three summers is:

1923, S 22b and S 20; 1924, S 21 and S 23a; 1925, S 22a and S 23b. The courses are of the same general character as the corresponding courses given in the fall and spring terms but include somewhat fewer topics. The selection of these topics will be influenced by the interests and needs of the class. Either half of the divided courses, S 22 and S 23, may be taken without the other.

To profit by these courses a student should have a knowledge of calculus and should have completed courses in general physics covering the principal topics of the subject and of a grade substantially equivalent to that of Physics S 4, and should have had courses in physical measurements substantially equivalent to Physics S 14. If he has not had sufficient laboratory experience he may complete this requirement by taking Physics S 14 simultaneously. A student who contemplates electing any of these courses is advised to correspond with the department about his preparation for the work.

Courses S 20 and S 75 may be taken for credit toward a master's degree in Physics, subject to the requirements of the graduate school. (See the *Announcement of the Graduate School*).

S 20. Heat. Credit two hours. Daily except Sat., 12. *Rockefeller* C. Assistant Professor MURDOCK.

Thermometry; heat transfer; equations of state; and an elementary study of the kinetic theory of gases and thermodynamics.

[S 21. *Light*.] Not given in 1923.

[S 22a. *Electricity and Magnetism*. Static, electric, and magnetic fields; direct current phenomena; gaseous, electrolytic, and metallic conduction; chemical and thermal electromotive forces.] Not given in 1923.

S 22b. Electricity and Magnetism. Electromagnetism, variable current phenomena, electric oscillations. Credit two hours. Daily except Sat., 8. *Rockefeller* 105. Assistant Professor KENNARD.

[S 23a. *Properties of Matter*. Dynamics of particles and rigid bodies, terrestrial and universal gravitation.] Not given in 1923.

[S 23b. **Properties of Matter.** Elasticity, surface tension; dynamics of fluids, viscosity.] Not given in 1923.

S 25. **Advanced Laboratory Practice.** Open to students who have had Physics S 14 (four hours of credit) or its equivalent. Credit varies with the amount of work done. The laboratory is open daily except Sat., 9-12. *Rockefeller* 301. Assistant Professor MURDOCK.

This course is intended to meet the requirements of the following classes of students: (1) those wishing to take up special topics for detailed study; (2) those taking Course S 20 or S 22b and desiring to supplement that work in the laboratory; (3) those who wish to develop their laboratory technique in preparation for research.

S 49. **Modern Developments in Physics.** Credit one hour. Three hours a week as arranged. *Rockefeller* C. Assistant Professor KENNARD, and other members of the staff.

A discussion of certain topics selected after conference with the members of the class including especially those topics that are not usually included in general texts. Whenever feasible, experimental demonstrations will be given.

S 75. **Special Topics for Investigation.** Students who are prepared to profit by the use of the library and laboratory facilities of the department in the study of some special topic or in investigation will be given an opportunity to do so. This work may be taken in connection with or independently of any of the above courses and will be under the direction of one or more members of the staff, with whom frequent conferences should be arranged. Credit varies with the nature and amount of work done.

For further information regarding opportunities for research and investigation during the Summer see the *Announcement of the Graduate School*.

PSYCHOLOGY

S 1. **Psychology.** Credit two hours. Lectures, M T W Th, 9. Professor TITCHENER. Recitations, F, 9. G. S. C. Assistant Professors DALLENBACH and HOISINGTON, and Dr. BISHOP.

This course furnishes a general introduction to the study of the normal human mind from the experimental point of view. It opens with the brief discussion of the nature of a scientific psychology, of the problems which such a psychology is called upon to face, and of the methods at its disposal for their solution. It then sets forth in order the facts and laws of mental life as indicated by experiment, beginning with sensation, image, and affection; it passes by way of attention, perception, association, and memory to the highly complex processes of imagination, voluntary action, and thought. Throughout the work use will be made of the unique collection of demonstrational apparatus which composes the equipment of a special laboratory in Goldwin Smith Hall.

Textbook: Titchener, *Textbook of Psychology*.

S 2. **Attention.** Credit two hours. Daily except Sat., 10. G. S. C. Assistant Professor DALLENBACH.

In this course the applications of Attention to advertising, to conjuring and sleight of hand, to hypnosis, to testimony, to efficiency, and to learning will receive special emphasis. The application will, however, be made only after the student has been grounded in the elementary facts and laws of Attention. The

development, the conditions, the kinds, and the levels of Attention will first be considered; then the experimental investigations will be reviewed; and thereafter the practical considerations will be taken up.

Demonstrations and class-experiments will be used frequently for illustration. No textbook will be prescribed, but the lectures will be supplemented by assigned readings in standard works.

S 3. Memory and Learning. Credit two hours. Daily except Sat., 8. G. S. C. Assistant Professor HOISINGTON.

The chief topics to be treated in this course are: the general nature of memory; the curve of learning; the conditions of impression, association, recall, and recognition; the correlation between different memories and between memory and other mental functions; teaching and the presentation of material; recitation and examination; "cramming" and efficient study; unusual memories and their conditions; the formation and the breaking of habits; mnemonic schemes and the "training" of memory.

Demonstrations and class-experiments will be made throughout the course. Readings will be assigned in standard texts and monographs to be found in the library.

S 4. Qualitative Laboratory. Credit two hours. M W F, 2:00-4:30. *Psychological Laboratory, Morrill Hall.* Assistant Professor HOISINGTON and Dr. BISHOP.

The purpose of this course is to furnish the student training in psychological method, and to give him a first-hand acquaintance with the contents of his own mind. The laboratory consists of twenty-seven rooms on the upper floors of Morrill Hall, including dark rooms, workshops, and offices. The equipment on the side of apparatus is especially complete, embracing besides the standard pieces for qualitative experiments a great variety of special instruments. The equipment of the research laboratory is also available for demonstrations. Experiments will be performed in vision, audition, and the other departments of sense, in feeling, attention, perception, and idea, and toward the end of the work the student may carry out experiments upon the more complex processes of association and action. The textbook is Titchener's *Experimental Psychology*, vol. i, *Qualitative Student's Manual*.

S 5. Quantitative Laboratory. Credit two hours. Three afternoons (to be arranged), 2:00-4:30. *Psychological Laboratory, Morrill Hall.* Assistant Professor DALLENBACH.

This course aims to furnish such training in the psychophysical methods and in the handling of instruments of precision as will be adequate preparation for research problems. The student will make experimental determinations of the stimulus limens, will attempt verifications of Weber's Law in various departments of sense, and will perform at least one experiment by each one of the chief psychophysical methods. Quantitative experiments in special fields may be undertaken in so far as time permits. The textbook is Titchener's *Experimental Psychology*, vol. ii, *Quantitative Student's Manual*.

Laboratory partnerships must be formed if the work of this course is to be pursued with profit. If, therefore, a partner cannot be found, the student is recommended to register in course S 7.

S 6. Technique of the Laboratory. Hours (three) to be arranged. *Psychological Laboratory, Morrill Hall.* Dr. BISHOP.

This course will discuss the equipment of a psychological laboratory, in the various fields of investigation and at various levels of expense. Demonstrations, with special emphasis upon principles of construction, will be given of standard pieces of apparatus contained in the Cornell University laboratories.

S 7. Experimental Problems. Hours and credit to be arranged. *Psychological Laboratory, Morrill Hall.* Assistant Professor DALLENBACH, Assistant Professor HOISINGTON, and Dr. BISHOP.

Courses S 1, S 4, and S 5, or their equivalents, are prerequisites for this course. The work will consist of the original study of certain experimental problems, and will involve both observation and manipulation of instruments. Completed investigations may be published in *The American Journal of Psychology*.

S 8. Problems and Persons in Systematic Psychology: Advanced Course. Daily except Sat., 11. G. S. C. Professor TITCHENER.

This course presupposes S 1 and S 4 or their equivalents. Certain of the major problems and personalities in systematic psychology will be discussed in some detail, with numerous references for collateral reading. A knowledge of French and German is necessary.

PUBLIC SPEAKING—ORAL ENGLISH

All courses are planned to meet the special needs of high-school teachers. Individual instruction will be given by appointment without additional charge.

S 1. Public Speaking. Credit two hours. Daily except Sat., 11. G. S. 21. Dr. CAPLAN.

A practical training for speaking in public. Methods of preparation and standards of delivery; drill in the delivery of extemporaneous and prepared original speeches, and of declamations; subject matter of speeches drawn largely from required readings. High-school teachers will find the methods applicable to their work in public speaking and in oral English. Regular students passing this course are admitted to second term of Public Speaking 1.

S 1b. Argument and Debate. Credit two hours. Daily except Sat., 9. G. S. 21. Dr. CAPLAN.

A study of the principles of conviction and persuasion, with training in analysis, in brief-drawing, and in rhetorical presentation. Emphasis on adaptation of argumentative material to the audience. Practice in speaking and debating, with drill in delivery. This course presupposes Public Speaking 1a or S1, and will be considered equivalent to the second term of Public Speaking 1.

S 3. Course for High-School Teachers of Public Speaking. Credit two hours. Daily except Sat., 11. G. S. 26. Assistant Professor HUNT.

A practical training course for teachers of public speaking, debate, and oral English; constant practice in speaking and drill in methods of preparation; planning of high-school courses; emphasis on aims, standards, and methods.

S 5. The Production of School Plays. Credit two hours. Daily except Sat., 9. G. S. 26. Consent of instructor necessary for admission. Professor DRUMMOND and Mr. HUDSON.

Theory of stage direction; choice of plays; elements of training; staging of plays; other practical phases of production; special emphasis on oral inter-

pretation; one act plays rehearsed. Students in S 5 should also take S 10 or S 8.

S 8. Voice Training. Credit one hour. Daily except Sat., 10. G. S. 21. Assistant Professor MUCHMORE.

A fundamental course for teachers of speech-training and public speaking. Exercises for the development of pure tone, flexibility, melody and strength of voice, clear enunciation, and for relief from high, strained tones, harshness, throatiness, and speakers' sorethroat; training for poise and ease of action. If needed, special exercises will be prescribed.

S 8a. Speech Correction and Advanced Voice Training. Credit one hour. Prerequisite S 8, or its approved equivalent, and the consent of instructor. M W F, hour to be arranged. G. S. 26. Assistant Professor MUCHMORE.

Readings in the science underlying voice-training and speech-correction, and discussions of theories and methods. For those having sufficient background to do somewhat independent work. Students may be required to take S 8.

S 9. Course for Teachers in Voice-Training and Oral Reading. Credit two hours. Daily except Sat., 12. G. S. 26. Consent of instructor required. Assistant Professor MUCHMORE.

Principles and methods in voice-training, phonetics, speech improvement, and oral reading. Both elementary and secondary school problems will be considered. Lectures, readings, discussions, and exercises.

S 10. Oral Reading. Credit two hours. Daily except Sat., 12. G. S. 21. Assistant Professor HUNT.

The first part of the course will be devoted to the elements of reading: attention, individualization, and sequence of ideas; the second part to the oral interpretation of literature, with special emphasis on the spirit rather than on the form. Individual drill, and preparation of at least one long selection. Regular students who pass this course will be admitted to the second term of Oral Reading, Course 10.

S 33. Pageantry. Credit two hours. Daily except Sat., 10. G. S. 26. Mr. HUDSON.

The history of pageantry; the relation of history, poetry, song, folk-lore, and drama to pageantry; writing, directing, and producing pageants; grouping and pageant acting. Special attention will be given to the "play-pageant" and to the reading of parts. The work of this course is correlated with that of S 5, S 8, and S 10. Not open to students of the regular session.

S 20. Seminary. For graduates. Hours to be arranged. Conducted by members of the staff.

For graduate students who have chosen Public Speaking as major or minor in candidacy for an advanced degree.

ROMANCE LANGUAGES

French

S 1. Elementary Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 290. Mr. HENRY.

Entrance credit, one unit.

The object of this course is twofold: first, to give beginners a thorough drill in the essentials of French pronunciation, grammar, and reading; second, to offer to teachers an opportunity of studying the methods of presentation of these subjects to beginners.

S 2. Intermediate Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 283. Dr. HOFFHERR.

Entrance credit, one unit. Prerequisite course S 1 or its equivalent.

S 3. Advanced Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 227. Professor LAMA.

Entrance credit, one unit. Prerequisite course S 2 or its equivalent.

S 4. Advanced Translation. Credit two hours. Daily except Sat., 9. G. S. 290. Prerequisite course S 3 or its equivalent. Mr. HEMRY.

S 5. Elementary Composition and Conversation. Credit two hours. Daily except Sat., 11. G. S. 290. Prerequisite course S 3 or its equivalent. Professor LAMA.

S 14. Advanced Composition and Conversation. Credit two hours. Daily except Sat., 10. G. S. 283. Assistant Professor GUILLOTON.

S 19. The Drama of the Romantic Movement. Credit two hours. Daily except Sat., 8. G. S. 221. Assistant Professor GUILLOTON.

Lectures in French on the Romantic Drama. Outside readings and reports.

S 21. Contemporary French Poetry. Credit two hours. Daily except Sat., 11. G. S. 281. Professor MASON.

Lectures and discussions of special topics in contemporary poetry with extensive outside reading and reports.

[S 23. **Introduction to French Philology.** Credit two hours. Daily except Sat. Special emphasis will be put upon the importance of a knowledge of philology for teachers.] Not given in 1923.

S 26. Corneille. Credit two hours. Daily except Sat., 10. G. S. 227. Dr. HOFFHERR.

Lectures in French on the life and works of Corneille and 'explications de textes'.

[S 30. **The Teaching of French.** Credit two hours. Daily except Sat., 10. G. S. 230.

A detailed discussion of the more modern methods of teaching French. Lectures, assigned reading, and observation.] Not given in 1923.

S 31. Phonetics. Credit two hours. Daily except Sat., 9. G. S. 283. Professor MASON.

Lectures on the basic phonetic laws of French and English and the teaching of French pronunciation by means of phonetics. Practical exercises in phonetic transcription and in the reading of French. This course is especially for teachers of French but is open to all students who wish to study the pronunciation of French and English.

S 35. France of To-day. Credit two hours. Daily except Sat., 12. G. S. 264. Assistant Professor GUILLOTON.

Lectures in French on the social, intellectual, and political life of the present.

French Readings. A series of readings in French will be given by Mademoiselle COURTOIS daily except Saturday at 2.15 p. m. in the Drawing Room of Sill Cottage.

French Lectures. A series of lectures in French dealing with French national life will be given by the members of the instructing staff in French on Wednesday evenings at 8 o'clock in *Goldwin Smith Hall*, Room 290.

La Maison Française. The Sill Cottage, situated on the Campus, is reserved for students of French. Mademoiselle Courtois is in charge and only French is spoken in the Cottage. Reservations should be made before June 1. In the dining room of Sage College, special tables where only French is spoken, are reserved for students of French. Students of French will find abundant opportunity for speaking French at the frequent social meetings held under the direction of Mademoiselle Courtois.

Spanish

S 1. Elementary Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 277. Mr. BERKOWITZ.

Entrance credit, one unit.

S 2. Intermediate Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 281. Mr. ZAPATA Y TORRES.

Entrance credit, one unit.

S 3. Advanced Course. Credit four hours. Daily except Sat., 8 and 12. G. S. 124. Mr. ALEMANY.

Entrance credit, one unit.

S 4. Advanced Translation. Credit two hours. Daily except Sat., 9. G. S. 277. Mr. BERKOWITZ.

S 5. Elementary Composition and Conversation. Credit two hours. Daily except Sat., 11. G. S. 281. Mr. ZAPATA Y TORRES.

S 7. Advanced Composition and Conversation. Credit two hours. Daily except Sat., 11. G. S. 277. Mr. ALEMANY.

Special attention will be given to free composition and correspondence. The course is conducted in Spanish.

S 16. The Drama of the Golden Age. Credit two hours. Daily except Sat., 8. G. S. 128. Professor DOYLE.

Lectures, outside reading, reports, and discussions.

S 19. Nineteenth Century Novels. Credit two hours. Daily except Sat., 9. G. S. 281. Professor DOYLE.

Lectures, translation, and discussion of representative works.

S 30. The Teaching of Spanish. Credit two hours. Daily except Sat., 10. G. S. 281. Professor DOYLE.

A course for the discussion of materials and methods in the presentation of Spanish in the secondary schools. Special attention will be given to phonetics, classroom methods, the choice and use of texts, and auxiliary materials.

Spanish Lectures and Readings. A series of lectures and readings in Spanish by members of the instructing staff will be given during the session.

La Casa Española. The Risley Cottage will be reserved for students of Spanish and will be in charge of a Spanish Directress. There will also be in Prudence Risley Hall a special table at which only Spanish is spoken. Students desiring rooms in the Spanish House should make reservations before June 1.

SUMMER SESSION OF THE COLLEGE OF LAW

The College of Law will offer, during the summer of 1923, a summer session of eleven weeks' duration, divided into two terms of five and one-half weeks each. Registration for the first term will occur on June 25, and instruction for this term will commence June 26 and end July 30. Registration for the second term will occur on August 2, and instruction will continue from August 3 to September 6.

FACULTY

LIVINGSTON FARRAND, A.B., M.D., L.H.D., LL.D., President of the University.
GEORGE G. BOGERT, A.B., LL.B., Dean and Professor of Law.
HORACE E. WHITESIDE, A.B., LL.B., Secretary and Lecturer in Law.

CHARLES K. BURDICK, A.B., LL.B., Professor of Law.
WALTER WHEELER COOK, A.M., LL.M., Professor of Law in the Yale University School of Law.
MERTON LEROY FERSON, A.M., LL.B., Dean and Professor of Law in the George Washington University Law School.
OLIVER LEROY McCASKILL, Ph.B., J.D., Professor of Law.
WARREN ABNER SEAVEY, A.B., LL.B., Dean and Professor of Law in the University of Nebraska College of Law.
ROBERT SPROULE STEVENS, A.B., LL.B., Professor of Law.
LYMAN P. WILSON, B.S., J.D., Professor of Law.

EDWARD ECKER WILLEVER, LL.B., Librarian.

ADMISSION

1. **Regular First-Year Students.** All applicants for admission to the summer session as candidates for the degree of LL.B. at Cornell are required to present a certificate or diploma showing that they have successfully completed two or more years of study, other than professional law study, in a university or college of approved standing, and have received an honorable dismissal.

2. **Students From Other Law Schools.** Applicants who are registered in other law schools and who desire to attend the summer session for the purpose of obtaining additional courses will be admitted upon presentation of a certificate stating that they are students in good standing at the law school in which they are regularly registered. Such students may not become candidates for the degree of LL.B. in the College of Law without complying with the entrance requirements for regular first-year students.

3. **Special Students.** (a) Applicants who have not completed the requirements for admission as regular first-year students will be admitted to the summer session as special students upon presentation of a certificate showing the completion of the course in an accredited high school. Such students may not count their law work toward the degree of LL.B. from the College of Law.

(b) Applicants who are twenty-one years of age may, in the discretion of the faculty, be admitted as special students where the training and experience of the applicants justifies their admission.

CREDITS AND CERTIFICATES

Students taking work in the summer session will be entitled to a certificate showing the fact of their attendance and the work completed. If such students are regularly admitted as candidates for the degree of LL.B., the work completed will count toward the degree.

PURPOSES OF THE SUMMER SESSION

It is believed that the summer session in Law can be of material benefit to several classes of students. To students who have not yet commenced the study of law, it affords an opportunity of taking a few law courses and testing their aptitude and their liking for law. It also affords the beginning law student an opportunity to get to the bar in the shortest possible period of time. By commencing the study of law in June, 1923, and continuing through three summer sessions and two regular college years, the beginning student can graduate from the Cornell Law School with the degree of LL.B. in September, 1925, and can in most States qualify for admission to bar examinations in October, 1925. This enables the earnest, industrious student, by two and one-quarter calendar years of intensive work, to complete his legal education and thereby save nine months of the period ordinarily required. This course of two and one-quarter calendar years does not, however, require an excessive amount of study, for it leaves in each calendar year approximately nine weeks for vacations.

The summer session also provides an opportunity to students who have failed in one or more courses to make up such courses by repeating work or by taking other subjects of an equivalent value, which will serve as substitutes.

The summer session also allows law students who have had one or two years of law study to secure advance credits and thus relieve themselves from a portion of the work during the regular college year, or to elect courses in the summer which they would not otherwise be able to obtain.

LIBRARY AND OTHER FACILITIES

The Cornell Law Library is composed of about 56,000 volumes, and covers with extreme thoroughness the whole field of the English Common Law in the United States and in the British Empire. Boardman Hall, the home of the Law School, is a stone building which is unusually cool and comfortable during the summer months.

TUITION

The tuition charge is \$65 for the whole session of eleven weeks, or \$35 for either term of five and one-half weeks.

COURSES OF INSTRUCTION

Contract. Credit five hours. Eight hours a week. Both terms. Williston's *Cases on Contract*. Professor PERSON.

The principles controlling offer and acceptance, consideration, reality of consent, legality, and rights of beneficiaries will be discussed in detail.

Property I. Credit three hours. Eight hours a week. Aigler's *Cases on Titles*. First term only. Dean BOGERT.

Introduction to the law of real property; estates; execution of deeds; the property conveyed; covenants for title; priorities; possessory titles.

Criminal Law. Credit four hours. Eight hours a week. Mikell's *Cases on Criminal Law*. Second term only. Professor WILSON.

A study of the criminal law, both common and statutory, including the historical development of this branch of law as well as the analysis of the necessary elements of crimes, and the consideration of the principal classes of crimes.

Principles of Legal Liability. Credit two hours. Six hours a week. Beale's *Cases on Legal Liability*. Second term only. Professor SEAVEY.

This course embraces a study of the fundamental bases of liability for torts and crimes.

Public Service and Carriers. Credit three hours. Eight hours a week. Burdick's *Cases on Public Service*. First term only. Professor BURDICK.

In this course are considered the bases of the duties of public service, and the extent of those duties as well as what rates are legal when fixed by the company and when fixed by the state, and what constitutes illegal discrimination. The peculiar duties and liabilities of common carriers of goods and passengers are also discussed.

Conflict of Laws. Credit three hours. Eight hours a week. Lorenzen's *Cases on Conflict of Laws*. First term only. Professor COOK.

The course treats of the principles of private international law; effect of nationality and domicile; applicability of foreign or extra-state laws in respect to domestic relations, torts, contracts, quasi-contracts, and judgments; the creation, transfer, etc., of all forms of property.

Taxation. Credit two hours. Six hours a week. Beale's *Cases on Taxation*. First term only. Professor STEVENS.

A study of the following topics: The taxing power and the limitations placed upon it by constitutions, the purpose of the tax, and the situs of the property or the domicile of the person; direct and indirect taxes; property and privilege taxes; the assessment and equalization, the collection and payment of taxes; the nature of the obligation to pay a tax; remedies for the imposition and collection of unauthorized taxes. Special attention will be devoted to some fundamental principles involved in Income, Inheritance, and Corporation Tax Laws.

Sales. Credit three hours. Eight hours a week. Woodward's *Cases on Sales*. Second term only. Mr. WHITESIDE.

This course is concerned with the formation of the contract of sale of personal property, the respective rights and duties of buyer and seller regarding the performance of the contract, the origin and incidents of warranties regarding the goods sold, and the remedies open to buyer and seller, respectively, in the various contingencies incidental to sales of goods.

New York Practice. Credit three hours. Eight hours a week. *New York Civil Practice Act and Selected Cases*. Second term only. Professor McCASKILL.

This course embraces a study of the practice and procedure in a civil action from the commencement of the action to judgment and execution; a study of the provisional remedies, including arrest, injunction, and attachment; the preparation of motion papers and a general examination of motion practice.

For further information, address the Secretary of the College of Law, Cornell University, Ithaca, New York.

SUMMER SCHOOL OF BIOLOGY

Under the auspices of the Summer Session of Cornell University and of the Summer School of the New York State College of Agriculture.

Students attending the School of Biology must register both in the Summer Session and in the Summer School of Agriculture, paying however but one tuition fee. See page 9.

STAFF OF INSTRUCTION

HOWARD BERNHARDT ADELMANN, A.M., Instructor in Animal Histology and Embryology.

JAMES CHESTER BRADLEY, Ph.D., Professor of Entomology.

OTIS FREEMAN CURTIS, Ph.D., Professor of Botany.

FRANK DICKSON, Instructor in Plant Pathology.

ARTHUR JOHNSON EAMES, Ph.D., Professor of Botany.

HARRY MORTON FITZPATRICK, Ph.D., Professor of Plant Pathology.

ALLAN CAMERON FRASER, Ph.D., Assistant Professor of Plant Breeding.

WILLIAM ARTHUR HAGAN, D.V.M., Professor of Pathology and Bacteriology.

RUFUS RICHARD HUMPHREY, A.M., Instructor in Animal Histology and Embryology.

OSKAR AUGUSTUS JOHANSEN, Ph.D., Professor of Entomology.

BENJAMIN FREEMAN KINGSBURY, Ph.D., M.D., Professor of Animal Histology and Embryology.

ROBERT MATHESON, Ph.D., Assistant Professor of Entomology.

WALTER CONRAD MUENSCHER, Ph.D., Instructor in Botany.

HUGH DANIEL REED, Ph.D., Professor of Zoology.

BERNARD SMIT, B.S., Assistant in Entomology.

FRANK BURKETT WANN, Ph.D., Instructor in Botany.

HERBERT HICE WHETZEL, A.B., Professor of Plant Pathology.

KARL MCKAY WIEGAND, Ph.D., Professor of Botany.

ALBERT HAZEN WRIGHT, Ph.D., Assistant Professor of Zoology.

GENERAL PLANS AND AIMS

The Summer School of Biology was organized to provide instruction of the highest grade in zoology, botany, and allied subjects. All the regular facilities of the University are at the disposal of the student, and as far as possible the staff has been restricted to members of the regular professorial rank in the University. The courses offered are for the most part those given during the regular academic year condensed into a period of six weeks, but not abridged. The work is particularly planned to meet the needs of teachers and graduate students who wish to know, in addition to the subject matter, something of the methods and sources in teaching; but undergraduates also, if sufficiently prepared, will find the courses adapted to their needs. Intensive rather than extensive work is necessarily expected of each student, as the courses are comprehensive.

The intensive interest in Biology at Cornell University over a period of years has resulted in a wealth of laboratory material, very extensive and in some

cases unique collections of both plants and animals, and a very complete working library, all of which are available to students prepared to make use of them. Ithaca is located in the Finger Lake region of Central New York, noted not only for its picturesque beauty, but for its richness in biological material of both plants and animals. In this respect the advantages of the University are perhaps not excelled by any other institution in the country. The collecting grounds are for the most part adjacent to the campus, and can be very readily reached. Within easy reach of the laboratories are freshwater marshes and lakes, salt springs, marl springs, marl bogs, peat bogs, extensive ravines with numerous waterfalls, and upland woods or fields overlying either calcareous or noncalcareous sandy or heavy soils. The country shows a considerable variation in elevation, thus giving samples of several life zones. It is therefore possible to use as illustrative material those inland organisms which may be obtained most readily by teachers throughout the country for use in their own classes.

COURSES DEALING PRIMARILY WITH PLANTS

(A limited amount of change in the hours scheduled may be made by the staff at the beginning of the session to avoid conflicts. In the case of morning laboratories the student may obtain permission, at the option of the instructor, to be absent for a period to attend a lecture in some other course. The time so lost is to be made up later.)

S 1. General Botany. Credit six hours. Equivalent to Botany 1. Lectures, M T W Th F, 8. Laboratory, M T W Th F, 2-4:30. Additional lectures and field studies at hours to be arranged. *Stone.* Professor EAMES and Dr. WANN.

This course is designed to furnish a general knowledge of the fundamental facts and principles of plant life. A careful study is made of form, structure, and reproduction of representatives from the principal groups, with a view to orient the student in the plant kingdom, and to acquaint him with the principal evolutionary tendencies exhibited. Considerable attention is given to life processes, particularly in the higher plants, and to information necessary in the prosecution of more advanced or practical work connected with plants and animals. Laboratory fee, \$5.00.

S 2. Plant Physiology. Credit four hours. Prerequisite course 1, chemistry, and permission to register. Lectures, M T W Th F, 12. Laboratory T W Th F, 9-12. *Stone.* Professor O. F. CURTIS.

This course is designed to acquaint the student with the general principles of plant growth. Topics such as water relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, and reproduction are studied in some detail, and particular emphasis is placed, both in laboratory and classroom, on discussions of the principles and their applications to growing plants. Laboratory fee, \$4.00; deposit, \$2.00.

S 3. Taxonomy of Vascular Plants. Credit four hours. Equivalent to Botany 6. Prerequisite course 1 or its equivalent. Lectures, M T W Th F, 11. Laboratory, M W, or T Th, 2-5; Sat., 8-1, 2-5. Several all-day field trips will be arranged. *Stone.* Professor WIEGAND.

A study of the kinds of seed plants and ferns; their classification into genera, families, and orders; and field work on the local flora. Emphasis will be placed on wild plants, but the more common cultivated plants will receive some attention.

The course is planned to follow Course 1 and to furnish an introduction to the knowledge of field botany and to the classification of the higher plants in preparation for special work in various departments and as an aid in teaching. Instruction will be given in herbarium methods. Laboratory fee, \$4.00; deposit, \$3.00.

S 4. Comparative Morphology of Fungi. Credit four hours. Equivalent to Mycology 14. Prerequisite course 1 or its equivalent and permission to register. Lectures, M T W Th F, 9. *Bailey, West Basement.* Laboratory, fifteen actual hours a week, by arrangement. *Bailey, East Basement.* Professor FITZPATRICK.

An elementary synoptical course designed to acquaint the student with the general field of mycology. Emphasis is placed on morphology and phylogeny, rather than on taxonomy, but abundant opportunity is given for field work. Laboratory fee, \$6.00; deposit, \$3.00.

S 10. General Plant Pathology. Credit three hours. Equivalent to Plant Pathology 1. Prerequisite course 1 or its equivalent and permission to register. Lectures, M W F, 7 A. M. Laboratory work: the completion of a minimum of fifteen exercises requiring not less than fifteen actual hours a week, with personal conference of half an hour on each. Conferences by arrangement. Laboratory at the student's convenience. Professor WHETZEL and Mr. DICKSON.

A fundamental course treating of the nature, cause, and control of plant diseases, illustrated by studies of the commoner diseases of cultivated crops. Admission limited to twenty students. Laboratory fee, \$4.50; deposit, \$3.00.

S 19. Special Problems with Plants. Credit two or more hours. Hours to be arranged.

Students who are sufficiently prepared may arrange to engage in the study of some problem or special topic. Such work may lie in the fields of general or taxonomic botany, mycology, plant physiology, or plant pathology. A certain member of the staff must supervise the work.

COURSES DEALING PRIMARILY WITH ANIMALS

S 20. General Zoology. Credit six hours. Equivalent to Zoology 1. Lectures, M T W Th F, 9. Laboratory, M T W Th F, 2-5. Field studies at hours to be arranged. *McGraw.* Professor REED.

A comprehensive view of the subject, including the fundamentals of animal biology; the principles of structure, function, origin, and perfection of animal life; and a consideration of generalizations in zoological theory which seem to be the best founded. The study of animals in their relation as living things will be emphasized. Animal types and their classification are employed only as a service base from which study may proceed. Laboratory fee, \$5.00.

S 21. Systematic Vertebrate Zoology and Ecology. Credit four hours. Lectures, T W Th F, 9. *McGraw* 7. Laboratory and field work, T Th, 10-1, 2-5; W F, 10-12. Some all-day trips are required. Occasionally a field trip, 5.30-8 A. M., or 5-8 P. M., may be substituted for the regular periods. Assistant Professor WRIGHT.

Lectures on fishes, amphibians, reptiles, birds, and mammals; their habits, life-histories, coloration, respiration, locomotion, reproduction, and adaptations; together with their classification, nomenclature, characters, and relationships. Laboratory study of the parts employed in the classification of these groups.

with training in the identification of two hundred and forty North American species. Field work is partially to give practice in field observation and in ready identification of local vertebrates in their natural environment, and partially to introduce some ecological methods. Textbook: Jordan's *Manual of Vertebrates of Northeastern United States*. Laboratory fee, \$3.00

S 26. Histology. The tissues and their histogenesis. Credit four hours. Equivalent to Histology 1. No prerequisite, but previous work in biology (zoology and botany) or physiology is recommended. Lectures, M W F, 8; M W, 12. Quiz, F, 2. Laboratory, M W, 9-12; 2-5. *Stimson*. Professor KINGSBURY and Mr. HUMPHREY.

For students of biology or those preparing for medicine. The cell and cellular origin of the body and the structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

The courses in histology and embryology are given in the histological laboratories in Stimson Hall. The department is well equipped for instruction in both subjects, having a large and adequate supply of modern microscopical instruments and an extensive collection of demonstration material for both histology and embryology. Microscopes are furnished by the department. Consultation with the instructors previous to registration is advised. Laboratory fee, \$6.00.

S 27. Embryology of Vertebrates. Credit four hours. Equivalent to Embryology of Vertebrates 4. Prerequisite, a course in the histology of the tissues or a satisfactory equivalent in other biological work involving training in the use of the microscope. Lectures, T Th F, 9; T Th, 12. Quiz, F, 12. Laboratory, T Th F, 10-12; T Th, 2-5. *Stimson*. Professor KINGSBURY and Mr. ADELMANN.

For students of biology or those preparing for medicine. Preparation and study of embryological specimens from all the chief groups of vertebrates. Particular emphasis is placed on the embryology of the amphibian, chick, and pig. The student also acquires a knowledge of special methods useful in embryological work. Laboratory fee, \$6.00.

S 30. General Entomology. Credit three hours. Equivalent to Entomology 3. Prerequisite Biology 1 or Zoology 1 or its equivalent. Lectures, M T W Th F, 10. Practical exercises, T Th, 2-5; S, 8-11. *Roberts* 392. Assistant Professor MATHESON.

This course includes lectures and demonstrations on the characteristics of the orders and families of insects, with a study of the habits, life-histories, and relations of insects to other animals and to plants. The laboratory work consists of the study of the structure, ecology, metamorphosis, and classification of insects. Field trips to study insects in their natural habitats are an important feature. Each student is required to collect and prepare a typical collection of insects. Opportunities are given for the rearing of insects in our Insectary and special work is offered to suit the needs of individual students.

Textbook: Comstock's *Manual for the Study of Insects*. Equipment: a good hand lens, several insect cases, insect pins, and labels. All of these can be purchased at Ithaca. Laboratory fee, \$2.50.

S 31. Elementary Morphology of Insects. Credit three hours. Equivalent to Entomology 4. Twenty-two actual hours a week, by appointment. *Roberts* 391. Professor JOHANNSEN and Mr. SMIT.

This course deals with the external and internal anatomy of several representa-

tive insects as the locust, roach, cicada, honeybee, crane-fly, etc. Laboratory fee, \$2.00.

S 32. Elementary Systematic Entomology. Credit two hours. Equivalent to Entomology 5. Prerequisite course 4. Fifteen actual hours a week, by appointment. *Roberts* 391. Professor BRADLEY and Mr. SMIT.

The principles of wing venation and the classification of the orders and families. Laboratory fee, \$2.00.

Courses S 31 and S 32 are required of all students who plan to take advanced work in Entomology.

S 33a. Field Entomology. Credit three hours. Field work. Prerequisite course S 30, or S 31 and S 32, or equivalent. M W F, 8-5. *Roberts* 301. Professor BRADLEY.

The methods of collecting and preserving insects and a systematic exploration of various types of environment, with a view to making as exhaustive a survey as time permits of selected representative insect groups; the ethology of selected insects and their breeding under control. Laboratory fee, \$3.00. Other expenses are the cost of transportation in connection with the excursions and the cost of equipment and supplies.

There will be an optional four-day excursion to the pine barren and coast regions of New Jersey, in order to study the totally different insect fauna of a life-zone and of ecological conditions not represented near Ithaca. The party will leave Ithaca the night of July 26, returning the morning of July 31. Expenses not to exceed \$40.

This course is designed to be taken in connection with S 33b.

S 33b. Advanced Systematic Entomology. Credit three hours. Open only to students who are taking Course S 33a. T Th, 8-5; S, 8-1. *Roberts* 301. Professor BRADLEY.

Taxonomy of selected groups of insects, using as laboratory material the specimens collected in course S 33a; matters of museum technique. Laboratory fee, \$3.00.

S 34. Advanced Morphology of Insects. Credit two hours. Equivalent to the first term of Entomology 20. Prerequisite course S 31, and either S 30 or S 32. Lectures, assigned reading, and reports. Daily, except Sat., 9. *Roberts* 392. Professor JOHANNSEN.

This course deals with the anatomy, physiology, and microscopic structure of insects.

S 39. Special Problems with Animals. Credit two hours or more. Hours to be arranged.

Students who are sufficiently prepared may arrange to engage in the special study of some problem or special topic. Such work may lie in the fields of general zoology, ornithology, histology, embryology, general entomology, systematic entomology, economic entomology, or general biology. A certain member of the staff must supervise the work.

GENERAL COURSES DEALING WITH BOTH PLANTS AND ANIMALS

S 40. Genetics. Credit four hours. Prerequisite, elementary botany and plant physiology, or elementary zoology and animal physiology. Courses in cytology and in taxonomic botany and zoology will be found helpful. Lectures,

M T W Th F, 8. Laboratory, M W F, 2-4.30. Conferences to be arranged. *Fernow*. Assistant Professor FRASER.

A general introductory course designed to acquaint the student with the fundamental principles of heredity and variation. Special attention is given to the Mendelian interpretations of the facts of inheritance. Among the topics to be discussed are: the physical basis of heredity; simple cases of Mendelian inheritance; factor interaction; the determination of sex; factor linkage; measurement of variation; quantitative inheritance; pure lines; inbreeding and cross-breeding; cytoplasmic inheritance; and mutation, with suggestions as to the relation of genetical principles to eugenics. Laboratory studies of variation and of laws of heredity as illustrated by hybrid material in plants and by breeding experiments with the fruit fly, *Drosophila*. Laboratory fee,

S 42. **General Bacteriology**. Credit three hours. Prerequisite, some work in microscopy. Lectures, M T W, 11. Laboratory, T W Th F, 9-1. *Veterinary College*. Professor HAGAN.

A general introductory course in bacteriology, covering the distribution, morphology, biology, and methods of study of micro-organisms. In the latter half of the course the bacteria occurring in water and in milk and some of the more common pathogenic forms are studied in both laboratory and classroom. Laboratory fee, \$10.00.

METHODS

Arrangements can be made, contingent upon the time of the instructor, for additional instruction in biological technique. This may include instruction in methods of collecting and preparing laboratory and museum material, in bird photography, in the technique of hybridization, etc.

RESEARCH

In addition to the various professors named as directly connected with the Summer School of Biology several other professors in residence during the summer will supervise graduate students engaged in research: Professors REDDICK and SHARP in Botany; Professors BLODGETT, BURKHOLDER, and THOMAS in Plant Pathology; Professors NEEDHAM, HERRICK, and CLAASSEN in Entomology; and Professors EMERSON, LOVE, and MYERS in Plant Breeding and Genetics.

Inquiries about courses in the Summer School of Biology should be addressed to Professor K. M. WIEGAND, Stone Hall, Cornell University, Ithaca, N. Y.

SUMMER SCHOOL OF AGRICULTURE

IN THE NEW YORK STATE COLLEGE OF AGRICULTURE

OFFICERS

Livingston Farrand, A.B., M.D., L.H.D., LL.D., President of the University.
Albert Russell Mann, B.S.A., A.M., Dean of the College of Agriculture, Director of the Experiment Station, and Director of Extension.
George Alan Works, Ph.B., M.S.A., Professor of Rural Education, in charge of the Summer School.
Robert Pelton Sibley, M.A., L.H.D., Professor and Secretary.

STAFF OF INSTRUCTION

Arthur Augustus Allen, A.M., Ph.D., Assistant Professor of Ornithology.
Elsa Guerdrum Allen, A.B., Assistant in Ornithology.
Thomas Levingston Bayne, jr., M.S., Instructor in Rural Education.
Charles Beaman, B.S., State Normal School, Brockport, N. Y.
Frederick Gardner Behrends, B.S., Assistant Professor of Rural Engineering.
James Chester Bradley, Ph.D., Professor of Entomology and Curator of Invertebrate Zoology.
Frances Artie Brookins, Associate Director of Costume Shop, Home Economics.
John L. Buys, B.S., Municipal University of Akron, Ohio.
Peter Walter Claassen, Ph.D., Assistant Professor of Biology.
Raymond Bridgman Cowles, B.A., Instructor in Biology.
Lewis Josephus Cross, Ph.D., Professor of Chemistry in its Relations to Agriculture.
George Harris Collingwood, B.S., A.M., Assistant Extension Professor of Forestry.
Anna Botsford Comstock, B.S., Emeritus Professor of Nature Study.
Katherine Cook, Bureau of Education, Washington, D. C., Specialist in Rural Education.
Clarence G. Cooper, Superintendent of Schools, Baltimore County, Maryland.
Agnes Houston Craig, B.S., M.A., Supervisor of Home Economics, Springfield, Massachusetts.
Ralph Wright Curtis, M.S.A., Professor of Ornamental Horticulture.
John D. Detwiler, Ph.D., Professor of Biology, Western University, London, Canada.
Theodore Hildreth Eaton, Ph.D., Professor of Rural Education.
Richard T. Ely, Ph.D., Professor of Land Economics, University of Wisconsin.
Emery N. Ferriss, Ph.D., Assistant Professor of Rural Education.
A. R. Gilliland, Professor of Educational Psychology, Lafayette College.
Agnes Hanna, formerly of the University of Chicago.
Merritt Wesley Harper, M.S., Professor of Animal Husbandry.
VanBreed Hart, B.S., Instructor in Farm Management.
Edwin Ray Hoskins, Instructor in Rural Education.
Oskar Augustus Johannsen, Ph.D., Professor of Entomology.
Clarence Edgar Lee, B.S.A., Instructor in Poultry Husbandry.

William Foster Lusk, B.Ph., M.S.A., Professor of Agriculture, Agricultural College, Mississippi.

Lawrence Howland MacDaniels, Assistant Professor of Pomology.

Robert Matheson, Ph.D., Assistant Professor of Economic Entomology.

John Clarence McCurdy, B.S., C.E., Assistant Professor of Rural Engineering.

Carolyn Brundage McIlroy, Instructor in Home Economics and Shop Director.

Lua Alice Minns, M.S. in Agr., Instructor in Floriculture.

Helen Monsch, B.S., M.A., Professor of Home Economics.

Richard Alan Mordoff, Ph.D., Assistant Professor of Meteorology.

Walter Conrad Muenscher, Ph.D., Instructor in Botany.

William Irving Myers, Ph.D., Professor of Farm Management.

Jacob S. Orleans, A.M., Institute of Educational Research, Columbia University.

E. Laurence Palmer, Ph.D., Professor of Rural Education.

George Eric Peabody, Instructor in Extension Teaching.

Frank Ashmore Pearson, Ph.D., Professor of Agricultural Economics.

Miles D. Pirnie, Assistant in Ornithology.

Joseph Pullman Porter M.S.A., M.L.D., Extension Instructor in Ornamental Horticulture.

Frank Elmore Rice, Ph.D., Assistant Professor of Chemistry in its Relations to Agriculture.

Louis Michael Roehl, B.S., Assistant Professor of Rural Engineering.

Harold Ellis Ross, M.S.A., Professor of Dairy Industry.

Ezra Dwight Sanderson, Ph.D., Professor of Rural Social Organization.

Henry William Schneck, M.S.A., Assistant Professor of Vegetable Gardening.

Bernard Smit, M.S., Instructor in Entomology.

Rolland Maclaren Stewart, Ph.D., Professor of Rural Education.

William Alonzo Stocking, M.S.A., Professor of Dairy Industry.

Carl C. Taylor, Ph.D., Professor of Rural Social Organization.

George Frederick Warren, Ph.D., Professor of Farm Management.

George Alan Works, Ph.B., M.S.A., Professor of Rural Education.

COURSES IN THE COLLEGE OF AGRICULTURE

The New York State College of Agriculture provides courses of instruction under the rules and regulations that follow:

1. **Admission.** The Summer School in the College of Agriculture is designed to meet the needs of persons engaged in educational work, such as teachers, supervisors, superintendents, extension workers, and others concerned with activities of an educational nature.

2. **Tuition and Fees.** Tuition in any of the courses following is free to admitted students who are residents of New York and who have been residents for at least one year immediately preceding registration. An incidental fee of ten dollars is, however, charged to all students for admission. Students from outside the State of New York, whether they take one subject or more, will pay \$40, in which is included the incidental fee. For the time and place of payment see page 9.

In certain courses laboratory fees are charged. These are indicated in connection with the courses. Fee cards must be procured from the instructor at the first exercise, and must be returned to him receipted within five days.

3. For special announcement regarding Physical Education, formerly given in this college, see page 68.

4. **Academic Credit for Work.** A student who has previously satisfied the entrance requirements of the College may obtain credit for work in a Summer School up to a limit of eight hours. Residence credit will be given if six hours are passed, but not more than a total of two terms of residence may be obtained by attendance at Summer Schools.

The demand for some courses is not great enough to justify offering them each year. For this reason certain departments of the College offer instruction only in alternate years. For the requirements of the degree B.S. (eight terms, 120 hours, etc.) see the *Announcement of the College of Agriculture*.

Summer Term. The Summer Term formerly conducted in this college during a period of twelve weeks, has been discontinued and additional courses are now being offered in the Summer School of Agriculture.

AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

S 2. Farm Management. Credit three hours. Lectures, daily except Sat., 8. Laboratory, W F, 2-4:30. *Farm Management* 102. Professor MYERS.

This course is designed for advanced and graduate students. It should be preceded by economics and as many as possible of the courses dealing with the production of crops and animals.

Lectures, recitations, and laboratory practice. Farming as a business; types of farming; balance of business; rates of production; farm layout; building arrangement; labor management; machinery; marketing; ways of beginning a farm; forms of tenure and leases; choosing and buying a farm; use of capital and credit; planning, organization, and management of specific farms. Out-of-town trips necessitate leaving on noon trains and returning on evening trains. Some expense for auto hire. Laboratory fee, \$2.00.

S 32. Agricultural Statistics. Credit two hours. Lectures, M F, 10. Laboratory, W F, 2-4:30. *Farm Management* 102. Professor PEARSON.

S 38. Seminary. Credit two hours. Lectures, daily except Sat., 11. *Farm Management* 102. Professor WARREN.

S 39. Agricultural Prices. Credit two hours. Lectures, M F, 9. Laboratory, M Th, 2-4:30. *Farm Management* 102. Professor PEARSON. For advanced and graduate students.

S 40. Public Problems in Agriculture. Credit two hours. Lectures, daily except Sat., 12. *Roberts Assembly*. Professor WARREN in charge.

A series of lectures intended to give a brief survey of some of the outstanding economic, social, and educational problems of agriculture. Among the speakers will be agricultural leaders of national prominence.

S 42. Characteristics and Classification of Land. Credit one hour. Lectures T W Th, 9. Professor ELY.

This course is designed as an introduction to the entire field of land economics. Attention is first given to the definition of land economics as a new and rapidly

growing division of economics. After an examination of the legal and economic characteristics of land as compared with those of capital, land classification is discussed. The remainder of the course consists of a treatment of the various kinds of land, the point of view being primarily economic and secondarily technical.

S 43. Land Policies. Credit one hour. Lectures, T W Th, 10. Professor ELY.

The aim of this course is to consider land policies from the point of view first of the nation, then of the state, and thirdly of local units; for example, cities, counties, and districts formed for special purposes, such as water supply and port facilities. Land policies will be considered with reference to their bearing on world peace. Land settlement, valuation, and taxation will receive special attention.

S 44. Cost and Income in Land Utilization. Credit one hour for those who also receive credit in courses 42 and 43. Conference period Tuesday afternoon. Professor ELY.

This course for advanced students will be devoted to an examination of some of the more difficult and controverted points in economic theory. Taking as a starting point the Ricardian theory of rent, an attempt will be made to formulate a theory of land income which corresponds more nearly to actual facts as shown by the results of recent research and discussions. The method will be that of modern accounting practice, setting costs over against income in the processes of land utilization.

ANIMAL HUSBANDRY

S 1. The General Principles of Animal Nutrition and Practice in Computing Rations. Credit two hours. Daily except Sat., 9. *Animal Husbandry B.* Professor HARPER.

S 2. Types and Breeds of Farm Animals. Credit two hours. Daily except Sat., 11. *Animal Husbandry B.* Professor HARPER.

The origin, history, and development of breeds, together with practice in scoring and judging.

BACTERIOLOGY

S 1. Bacteriology. Credit two hours. Lectures, T Th, 9. *Dairy Building 222.* Laboratory, M W F, 2-5. *Dairy Building 122.* Professors STOCKING and Ross.

A general course in bacteriology covering the general characteristics of bacteria, methods of study, and their relation to the sanitary and economic phases of agriculture. This course is given by the Department of Dairy Industry and is especially designed for teachers of agriculture, botany, and biology. Laboratory fee, \$3.00.

BIOLOGY

S 1. General Biology. Credit three hours. Lectures and recitations, daily except Sat., 11. *Roberts 293.* Laboratory and field work, M W F, 2-4:30; other sections by special appointment. *Roberts 302.* Assistant Professor CLAASSEN and Mr. COWLES.

This is a course designed to acquaint the general student and the prospective teacher with the main ideas of biology through selected practical studies of the phenomena on which biological principles are based. Lectures, laboratory work, and field trips will deal with such topics as: interdependence of organisms as illustrated by insects and flowers, insects and galls, etc.; the simpler organisms, such as amoeba, paramecium, flagellates, and other protozoans; and algae, fungi, bacteria, and slime molds among plants. The study of these simpler organisms will be followed by studies of such plant types as liverworts, mosses, and ferns, and such animal types as hydra, earthworm, and frog.

Prospective teachers will be given an opportunity to acquaint themselves with methods of collecting and preparing material for class use. If there is a sufficient demand, a one-hour conference each week will be arranged for students in the course who are interested in the discussion of special problems in the teaching of biology.

Students completing this course will be given credit for the first term's work in Biology I of the regular academic year. Laboratory fee, \$2.50.

Other courses in the biological sciences are offered in the Summer School of Biology; see p. 51.

BOTANY

S 5. **Trees and Shrubs.** Credit two hours. Lectures, Th, 2. Laboratory or field work, T, 2-5, Th, 3-5. *Stone.* Dr. MUENSCHER.

A course intended for those who wish to know the woody plants in the field. The aim is to familiarize the student with as many as possible of the trees and shrubs of the Cayuga Lake flora and to teach the main facts of structure, growth, habit, and distribution concerning them. Some all-day trips will be required. Laboratory fee, \$1.50; deposit, \$3.00.

Other courses in the biological sciences are offered in the Summer School of Biology; see p. 51.

CHEMISTRY

S 805. **Agricultural Chemistry.** General course. Credit two hours. Prerequisite, introductory chemistry. Lectures, daily except Sat., 9. *Caldwell* 100. Professor CROSS.

The relation of chemistry to agriculture, and an introduction to the study of the composition and chemical properties of plants, fertilizers, feedstuffs, insecticides, and fungicides.

S 806. **Agricultural Chemistry, Introductory Laboratory Course.** Credit two hours. Prerequisite, qualitative and quantitative analysis. M T W Th, 2-5. Other sections by special arrangement. *Caldwell* 250. Assistant Professor RICE.

Chemical tests and the simpler analyses of plant materials, feedstuffs, soils, fertilizers, insecticides, and fungicides, with the end in view of giving the student a clear knowledge of their chemical composition and behavior. Recitations held during laboratory periods.

S 650. **Chemistry of Foods and Food Products.** Credit two hours. Prerequisite, introductory chemistry; should be preceded also by a course in organic

chemistry. Lectures, daily except Sat., 11. *Caldwell* 100. Professor CROSS.

The chemical composition, chemical properties, and methods of manufacture of the principal foods and food products. Methods for the determination of the normal constituents of foods. Special attention given to the chemistry of milk and milk products, cereal products, sugars, fruits, and fruit products.

S 820. Chemistry of Foods, Elementary Laboratory Course. Credit two hours. Prerequisite, introductory chemistry; should be preceded also by a course in organic chemistry. M T W Th, 2-5. Other sections by special arrangement. *Caldwell* 250. Assistant Professor RICE.

The chemistry of proteins, fats, carbohydrates, potable water, baking powders, jellies, syrups, butter, oleomargarine, olive oil, salad oils, cheese, milk, food preservatives, artificial coloring, flavoring extracts, habit-forming agents, tooth powders, and so forth. Recitations held during laboratory periods.

S 825. Chemistry of Foods and Food Products. Laboratory Course. Credit two hours. Prerequisite, qualitative and quantitative analysis and organic chemistry. M T W Th, 2-5. *Caldwell* 250. Assistant Professor RICE.

Designed as a beginning laboratory course for students expecting to take further work in the chemistry of foods. The conventional "complete" analysis of carbohydrate foods is made. Examination and analysis of proteins, fats, carbohydrates, soaps, baking powders, jellies, syrups, butter, oleomargarine, olive oil, salad oils, cheese, milk, artificial coloring, flavoring extracts, and so forth.

S 860. Special Topics and Research. Students desiring special advanced work in soils, fertilizers, insecticides, fungicides, foods, dairy products, feeding stuffs, condimental stock feeds, etc., or those taking research should register for this course. One to three hours may be taken. Consult Professor CROSS or Assistant Professor RICE not later than registration day.

ENTOMOLOGY

S 3. General Entomology. Credit three hours. Identical with S 30 in Summer School of Biology. Prerequisite Biology 1, or Zoology 1 or its equivalent. Lectures, M T W Th F, 10. Practical exercises, T Th, 2-5 and S, 8-11. *Roberts* 392. Assistant Professor MATHESON.

This course embraces lectures and demonstrations on the characteristics of the orders and families of insects: their habits, life-histories, and relations to other animals and to plants; methods of rearing, studying, collecting, and mounting insects.

The laboratory work will consist in the study of the structure, ecology, metamorphoses, and classification of insects. Field trips to study insects in their natural habitats will be an important feature. Each student will be required to collect and prepare a typical collection of insects. Opportunity will be given for the rearing of insects in our Insectary and special work to suit the needs of students will be offered. Textbook, Comstock's *Manual for the Study of Insects*. Equipment: A good hand lens, several insect cases, insect pins, and labels. These can all be purchased at Ithaca. Laboratory fee, \$2.50.

S 4. Elementary Morphology of Insects. Credit three hours. Identical with S 31 in the Summer School of Biology. The work is individual; twenty-two actual hours a week in the laboratory at times to be arranged. In this course the external anatomy of a number of insects (locust, bee, cicada, ground beetle,

etc.) is studied as well as the internal anatomy of some large representative species. *Roberts* 391. Professor JOHANNSEN and Mr. SMIT. Laboratory fee, \$2.00.

S 5. Elementary Systematic Entomology. Credit two hours. Identical with S 32 in the Summer School of Biology. The work is individual; fifteen actual hours a week at times to be arranged. Prerequisite Course 4. The aim of this course is to acquaint the students with the external structure of insects for the purpose of identification of the commoner families. *Roberts* 391. Professor BRADLEY and Mr. SMIT. Laboratory fee, \$2.00.

Courses 4 and 5 are required of all students who plan to take advanced work in entomology.

EXTENSION TEACHING

S 1a. Oral Expression. Credit two hours. Lectures and practice, daily except Sat., 10. *Roberts* 131. Criticism by appointment, daily, 8-1. Attendance limited to 20 students. Mr. PEABODY.

Practice in oral and written presentation of topics in agriculture, with criticism and individual appointments on the technique of public speech. Designed to acquaint students with parliamentary practice, to encourage interest in public affairs, and, through demonstrations and the use of graphic material and other forms, to train for effective self-expression in public.

FLORICULTURE

S 1. Garden Flowers. Credit one hour. Lectures, M F, 11. Laboratory, Th, 2-5. *Greenhouses.* Miss MINNS.

This is designed as an elementary course to be of value in home flower garden or school garden work. It is outlined so as to acquaint students with the most valuable material for this work, and to cover as time will permit, methods of propagation and culture. Laboratory fee, \$1.50.

S 2. Indoor Flower Growing. Credit one hour. Lectures, T Th, 11. Laboratory, T, 2-5. *Greenhouses.* Miss MINNS.

The propagation and culture of plants suitable for winter gardens in school-rooms, including a study of containers, soils, fertilizers, insecticides. The selection of varieties of bulbs and their methods of culture indoors are considered, as are also the method of propagation and general care of species of plants suited for indoor culture.

S 3. Planning and Planting Rural Properties. Credit two hours. Lectures, T W Th, 9. Practice, M, 2-5, S, 8-11. *Greenhouses.* Mr. PORTER. Laboratory fee, \$1.50.

A discussion of the principles underlying simple arrangements and planting in home grounds, school grounds, and village improvement work. The course will consist of lectures to illustrate fundamental principles; practice and field trips to observe land conditions; making small surveys; preparing simple plans; learning the common plants and utilizing them in planting practice.

S 4. Garden Flowers. Credit four hours. Lectures, daily except Sat., 9. Laboratory, W F, 2-5. *Greenhouses and Gardens.* Miss MINNS and Mr. PORTER. Must be accompanied by S 5. Laboratory fee, \$2.00.

This course, planned primarily for graduate and advanced students in flori-

culture and ornamental horticulture, comprises a study of herbaceous plant materials. The aim is to give the student such an intimate knowledge of these forms of plants as may be used in garden planting, either on home grounds, rural social centers, or public parks, more particularly with reference to summer conditions. Students must have had sufficient botany to be familiar with the botanical characters and classification. An excellent collection of plant material is available for demonstrations. All members of the class will participate in an excursion to the Thompson Estate at Canandaigua on August 17.

S 5. Woody Plant Materials. Credit five hours. Lectures, daily except Sat., 8. Laboratory and field trip, daily, 10-12:30; M T Th, 2-5. *Greenhouse and Campus.* Professor CURTIS and Mr. PORTER. Must be accompanied by S 4. Intended for graduate students and advanced students in floriculture and ornamental horticulture. Laboratory fee, \$2.00.

A study of the characteristics and requirements of trees, shrubs, and vines, for ornamental planting. The laboratories and field trips enable the student to recognize common woody plants. The lectures discuss planting areas and planting practices, and plant materials, in order that the student may learn to see plants not only as growing things but as possible units in planting design with which he may be able to improve his surroundings. All members of the class must participate in an excursion to Buffalo and Rochester on August 17 and 18 to visit private estates and public parks.

FORESTRY

S 1. The Tree and The Forest. Credit one hour. T Th, 8. Field work, M, 2-4:30. *Forestry 122.* Assistant Professor COLLINGWOOD.

This course lays emphasis on simple means of identification of the principal forest trees of this region. It includes a study of the characteristics of forest trees and forest types, the life history of the forest, and other facts fundamental to the right use of forests. Some attention will be given to the identification and the commercial uses of a few of the principal kinds of woods. Field work supplements the work in the lecture room.

S 2. Forests and Forestry. Credit two hours. Lectures, M T W F, 10. Field work, Th, 2-4:30. *Forestry 122.* Assistant Professor COLLINGWOOD.

This course will carry forward the foundation work of Forestry S 1. It presupposes a working knowledge of the native trees. The two courses, while independent, are supplementary of each other. Forestry S 1 is not prerequisite.

Topics to be considered: the nature and scope of forestry; methods employed in the perpetuation of forests; the economic importance of forests to the nation, including influence on stream flow and the relation of the forest to recreation with special application to New York State; brief description of the forest regions of the United States; present status of Federal, State, and private forestry.

As far as is possible, the lectures are followed by opportunities to make special observations in the field.

HOME ECONOMICS

The courses in Home Economics are planned to meet the needs of teachers in rural schools, high schools, and colleges. For entrance requirements see p. 58.

The courses in methods of teaching are given in the Department of Rural Education and descriptions of these courses will be found under that heading.

Foods

S 3a. Introductory Course in Foods, Part I. Credit five hours. Lectures, daily except Sat., 8. *Home Economics* 245. Practice, daily except Sat., 9-1. *Home Economics* 200. Professor ———.

This course parallels the regular course in foods and will be accepted as equivalent to the first term's work in Foods 3. Laboratory fee, \$15.

S 3b. Introductory Course in Foods, Part II. Credit four hours. Prerequisite S 3a. Lectures, daily except Sat., 9. *Home Economics* 245. Practice, daily except Sat., 10-1. *Home Economics* 205. Assistant Professor ———.

This course parallels the regular course in foods and will be accepted as equivalent to the second term's work in Foods 3. Laboratory fee, \$15.

Courses for establishing a fundamental knowledge of foods. The lectures will include a discussion of the composition and characteristics of foodstuffs; sources and methods of manufacture of foods; principles of selection and methods of preparation of foods; preservation of foods; conservation of foods; comparative nutritive and economic value of various foods. Laboratory practice will be given in applying scientific principles to food-preparation.

S 4. Dietetics. Credit three hours. Lectures and recitations, daily except Sat., 9. *Home Economics* 100. Laboratory practice, T Th, 2-5:30. *Home Economics* 200. Written reviews for those wishing credit in the course, Sat., 9.

This course will include a discussion of the fundamental principles of nutrition as they apply to the human being; the practical means of applying scientific principles in planning dietaries; special problems of nutrition, as the feeding of infants and children. The laboratory work will consist of exercises in estimating the comparative cost and nutritive value of various foods; in planning and judging various types of dietaries; in preparing typical meals. Open only to students who have had course S 3 or its equivalent. This course does not parallel the regular course and is not accepted as a substitute from regular students. Laboratory fee, \$7.50.

S 31. Nutrition of Children. Credit two hours. Prerequisite S 4 or its equivalent. Lectures and recitations, M W, 11. *Home Economics* 100. Laboratory practice, M W F, 2-5. *Home Economics* 205. Professor MONSCH.

The nutrition of the child and ways of improving it will be considered. Laboratory work will be conducted with groups of children of school age.

Clothing

S 60a. Clothing and Textiles. Introductory course. Credit three hours. Practice, daily except Sat., 8-10:30. *Home Economics* 300. ———. Lectures, M W F, 12. *Home Economics* 300. ———. Number of students limited to fourteen.

This course includes hand and machine sewing, the use and adaptation of commercial patterns and designing of garments, some textile study, and one problem in millinery. The work consists of demonstrations, discussions, and practice. Students provide all materials, subject to the approval of the instructor. Estimated expense, \$10 to \$12. Laboratory fee, \$3.

S 60b. Clothing and Textiles. Introductory course. Credit three hours. Practice, daily except Sat., 8-10:30. *Home Economics* 305. ————. Lectures, M W F, 12. *Home Economics* 305. ————. Number limited to fourteen.

This course includes practically the same subject matter as S 60a but is given from the public school teacher's point of view. Practice will be given in the most approved methods of presenting clothing subject matter to be used in teaching. Estimated expense, \$10 to \$12. Laboratory fee, \$3.

S 65a. Constructive Costume Design. Credit two hours. Prerequisite S 60 or its equivalent and elementary design. Practice, daily except Sat., 2-5. *Home Economics* 300. ————.

This course includes a study of the fundamental principles of design as expressed in modern costume. Students develop these principles by means of paper, materials, and black-board sketching. Designing is done with flat patterns and through draping. Open only to students expecting to teach. Estimated expense, \$8.

S 75. Commercial Clothing Instruction. Credit two to four hours. Prerequisite or parallel, S 60 or the equivalent. Open only to students preparing to teach. Laboratory practice by arrangement. *Home Economics* costume shop. Number of students limited to fourteen. Mrs. MCILROY and Miss BROOKINS.

This course considers problems of dressmaking and shop management. The students work under instructors experienced in commercial practice. Dressmaking problems in construction, fitting, finishing, designing, and in meeting customers are considered. The shop is equipped as a typical shop with a number of paid workers; hence it furnishes an opportunity to work out problems in shop organization and management.

S 80. Elementary Millinery. Credit two hours. Prerequisite S 60 or its equivalent. Practice, daily except Sat., 2-4:30. *Home Economics* 305. ————.

This course considers the methods of manipulation in the construction of hat frames; the use and renovating of old materials; the preparation of trimmings; the study of color, shape, and trimmings as to suitability, becomingness, and income; comparison with commercially made hats. Students provide all materials. Estimated cost from \$6 to \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

S 120. Household Management. Credit three hours. Lectures, daily except Sat., 8. *Home Economics* 100. ————. Laboratory practice, MW, 2-4:30. Conferences and assignment of problems by appointment. *Home Economics* 265. ————.

This course includes a study of standards of living; source and division of income; the making of the budget; the choice and cost of food, shelter, clothing, operating, and development; the choice, care, and cost of equipment; elimination of waste and greater efficiency in the use of energy, materials, time, and money; personal and household accounts; savings and investments. Laboratory fee, \$1.00.

METEOROLOGY

S 1. Meteorology and Climatology. Credit two hours. Lectures and discussions, daily except Sat., 10. *Robert's* 292. Assistant Professor MORDOFF.

This course is adapted to the needs of teachers and students of subjects in which weather and climate are important factors, particularly teachers of physical geography and general agriculture. It is designed to acquaint the student with the laws governing the primary and secondary circulation of the atmosphere and with the development, progression, and conditions that attend cyclones, tornadoes, and other atmospheric phenomena. Attention is given to the principles and practice of weather forecasting from weather maps and from local observations.

S 2. Meteorology and Climatology, Laboratory Course. Credit one hour. W F, 2-4:30, or other periods to be arranged. Must be accompanied by Course S 1. *Dairy Building* 341. Assistant Professor MORDOFF.

The work consists in the study of the principal weather and climatic elements with the aid of maps, charts, and instruments. The various meteorological instruments will be studied, as well as the methods of taking and recording the observations.

NATURE STUDY

S 1. General Nature Study. Credit two hours. Lectures, M W F, 10. *Forestry* 16. Field and laboratory observations, T Th, 10-12:30 or 2-4:30, *Forestry* 16. Professors PALMER and COMSTOCK, Assistant Professor DETWILER, Dr. BUYS, and Mr. BEAMAN

The object of this course is to acquaint teachers with the principles and methods of education through nature study and to give them practice in types of work which will permit them to carry on the work independently. As many as possible of the laboratory periods will be spent in the fields in the study of birds, trees, plants, and insects, and students anticipating taking the course should keep this in mind. The program adopted by the *Cornell Rural School Leaflet* since January 1920 will be followed in lectures and the exercises will include practical methods for conducting nature study in graded and ungraded elementary schools.

S 3. Nature Literature. Credit two hours. Lectures, M W F, 11. Laboratory periods to be arranged. *Forestry* 16. Professor COMSTOCK.

Only those who have had course S 1 or its equivalent are eligible. This course includes discussions of nature study reference books, nature story writers, and nature essayists and poets.

S 4. Friends and Enemies of the Garden. Credit two hours. Lectures, T Th, 8. Laboratory and field work, M W F, 9-11. *Forestry* 16. Assistant Professor DETWILER.

This course is designed especially as an aid to teachers of gardening. It deals with common garden insects and their natural foes in such a manner that the methods employed may be used in nature study lessons supplementary to school gardening.

For announcement of courses in the teaching of elementary science in secondary schools see under Rural Education, p. 72.

ORNITHOLOGY

S 1. Ornithology. Credit three hours. Lectures, M W F, 11. *McGraw* 5. Laboratory, M W, 2-5, or T Th, 2-5. Field work, M W, or T Th, 5:30-8 a. m. Assistant Professor ALLEN, Mrs. ALLEN, and Mr. PIRNIE.

This course gives an introduction to the study of birds and familiarity with the local species. The lectures cover such subjects as classification, migration, coloration, song, nest-building, eggs, care of young, methods of attracting birds, and economic importance. The laboratory work with bird skins gives an intimate knowledge of the birds of Eastern North America and familiarity with the use of a manual. The aim of the field work is the identification of birds by their songs, as well as by their plumage and habits. Each student should be provided with Chapman's *Handbook of Birds of Eastern North America* and with field or opera glasses. Laboratory fee, \$2.

S 2. Applied Ornithology. Credit two hours. Lectures, T Th, 11. *McGraw* 5. Laboratory and field work, T Th, 2-5. Open only to those who are taking the elementary course or who have had its equivalent. Assistant Professor ALLEN.

This course is intended to meet the needs of teachers or students who plan further study of ornithology. The lectures cover the field open to prospective ornithologists, methods of teaching, preparation of specimens and lantern slides, bird photography, wild life conservation, and game farming. The laboratory and field work will give practical exercises. Laboratory fee, \$2.

PHYSICAL EDUCATION

The entire program of physical education, formerly given in this college during the summer, has been transferred to the Cortland Normal and Training School at Cortland, New York. Students previously registered in this college will be given credit at the Cortland Normal and Training School for work done. All correspondence should be addressed to the Principal at Cortland, New York.

POULTRY HUSBANDRY

S 1. Principles and Practice of Poultry Management. Credit five hours. Lectures, daily, 8. *Poultry* 325. Laboratory, T Th F, 2-4:30. *Poultry* 300. Mr. LEE.

Designed primarily for teachers in agricultural high schools and other secondary agricultural schools. The course consists of thirty-six lectures and preliminary examinations, and eighteen laboratory practice periods; and includes a general discussion and practical application of the principles of incubation; brooding; rearing; feeding; illumination; breeding for constitutional vigor and egg production; sanitation and disease; marketing; housing; and general poultry farm management.

Feeding, incubating, brooding, and marketing practice three times daily by appointment, morning, noon, evening. *Poultry Auxiliary Buildings.* Practice in feeding for egg production and for fattening includes the preparation for market, record keeping, and general care and management of fowls. Practice in incubating includes operation of incubators, disinfection, record keeping, and general management of the hatch. Brooding practice includes feeding, brooding, caring for

young chicks, keeping of temperature, food, and growth records. Marketing practice includes cleaning, testing, grading, packing, and shipping eggs, and preparing poultry for market. Laboratory fee, \$5.

RURAL EDUCATION

S 2. Educational Psychology. Credit two hours. Daily except Sat. Section I, 9. *Caldwell* 143. For students desiring a more intensive course. The first half of a four-hour course, the second half of which will be given in 1924. Section II, 11. *Caldwell* 143. Section III, 8. *Caldwell* 100. Section IV, 2. *Caldwell* 143, to be given only if a fourth section is needed. Professors ORLEANS and GILLILAND.

The original nature of man; reflexes, instincts, and capacities; laws of learning and of habit-formation; acquisition of motor control; memorizing; efficiency and improvement; transfer of training; individual differences; mental measurement.

S 4. Principles of Teaching. Credit two hours. Daily except Sat., 11. Professor STEWART or Professor GILLILAND.

A consideration of the problems of teaching; how to motivate study, cultivate interest, organize teaching materials, plan classwork, select and solve problems, construct and present questions, drill, measure the results of teaching, etc., to make clear the principles which are fundamental to efficient instruction.

S 6. Teaching Agriculture in the High School. Section I, credit three hours. Daily except Sat., 9. *Rural Engineering Lecture Room*. Laboratory, M W, 2-4:30. *Caldwell* 282. Designed primarily for prospective teachers of agricultural courses. Section II, credit two hours. Daily except Sat., 9. *Forestry* 116. Designed primarily for experienced teachers. Professors STEWART and LUSK, and Mr. HOSKINS.

A study of the problems confronting the teacher of agriculture; the vocational point of view in instruction; determination of courses of study; making up the agricultural part of the curriculum; forms of teaching, including a consideration of the use of the project and the survey and selection and utilization of texts, materials, and equipment; the organization of the materials of instruction in agricultural subjects; the relationships of the teacher to other agencies.

S 7. Teaching Home Economics in the High School. Credit four hours. Lectures and discussions, daily, 8-10. Conference hours to be arranged. *Home Economics* 265. Miss HANNA.

This course is particularly concerned with modern methods of education as related to home economics and is designed to assist teachers in strengthening their methods of teaching. Problems treated: the needs and interests of the high school girl and the project as one means of meeting these needs; the socialized class hour; supervised study; selection, organization, and presentation of instruction units; evaluating and recording the progress of pupils; class management; selection and use of textbooks, references, and illustrative material.

S 10. Educational Measurement. Credit two hours. Section I, daily except Sat., 9. *Caldwell* 282. For teachers and principals. Mr. BAYNE.

The need, the means, and the general method of measurement in education; typical tests and scales from the point of view of their use by the teacher, supervisor, and principal; relation of achievement tests and mentality tests; elementary statistical terms and methods; teachers' marks.

Section II, T Th F, 2-4. *Caldwell* 282. For superintendents and other administrative officers. Mr. BAYNE.

The need and method of measurement in education as related to the work of superintendents and other administrative officers. School achievement tests, mentality tests, teachers' marks, score cards for teachers, etc. Emphasis will be placed upon the statistical treatment of educational data; the collection of educational data, the tabulation and classification of the data, the summarization of the data, and their presentation to school patrons or other interested groups in tabular and graphic form.

S 14. **The Training of Teachers of Agriculture.** Credit two hours. Lectures, daily except Sat., 8. *Caldwell* 282. Professor LUSK.

A course based upon a study of the work of teachers of agricultural vocations in secondary schools. In the light of such study will be discussed the demands upon the teacher in terms of capacities and abilities; current and ideal standards of qualification in teachers; the aims, admission requirements, course-content, methods, and administrative organization of institutions for the training of teachers of agricultural vocations.

S 15. **Problems of Training Teachers of Home Economics.** Credit two hours. Daily except Sat., 2. *Home Economics* 265. Miss CRAIG and Miss HANNA.

This course is designed to meet the needs of persons who have had both technical preparation in home economics and experience in teaching, and who desire to prepare for the special problems involved in the professional work of preparing teachers of home economics. It treats of collegiate and secondary curricula in home economics with reference to the technical preparation of teachers, their professional needs, supervised teaching experience, and the organization and content of the special methods courses in home economics.

S 16. **Rural Secondary Education.** Credit two hours. Daily except Sat., 8. *Caldwell* 143. Assistant Professor FERRISS.

A course dealing with basic problems of modern secondary education in its adaptation to rural conditions. Special consideration is given to the junior high school as a practicable form of high school organization for the rural community. Other guiding topics are the scope and functions of the secondary school; present demands upon the rural secondary school; the rural senior high school; pre-vocational and vocational work; educational and vocational guidance; extra-classroom activities; needed forms of extension work in the rural high school; selection of subject-matter and organization of the curriculum.

S 17. **The Rural and Village Principalship.** Credit two hours. Daily except Sat., 11. *Caldwell* 282. Assistant Professor FERRISS.

A course designed primarily for principals of high schools having also the elementary grades and for those preparing for such positions. It deals with such practical problems as the preliminary organization of the work of the school; the keeping and use of school records; the testing, grading, and promotion of pupils; school government and problems of discipline; direction and control of pupil's activities; pupil guidance and the supervision of pupil's study; aims and methods of supervision; teachers' meetings; measurement of teachers' efficiency; the problem of school exercises; the principal and the community.

S 18. **Principles of Rural School Administration.** Credit two hours. Daily except Sat., 9. *Caldwell* 294. Mrs. COOK.

The purpose of this course is to develop the principles that govern the organization and administration of education in a State, particularly with reference to the rural situation. The chief problems to be considered are functions of local, State, and intermediate units of school control; an evaluation of different types of local and intermediate units—county, township, district, community; forms of organization for the most effective performance in each unit; Federal leadership; functions of laymen and professional officers; sources of school funds; methods of distributing them; State regulation of school finances; budget making. An application of the principles developed will be made to several fundamental problems.

S 19. Administrative Problems of District and County Superintendents. Credit two hours. Daily except Sat., 3. *Caldwell* 282. Superintendent COOPER.

This course will consider some of the chief problems of the superintendent as the responsible rural school leader: (1) ideals of such leadership and methods of securing community co-operation in making leadership effective; (2) an evaluation of the legal responsibility and authority of the superintendent; (3) the school plant—measuring it, remodeling old buildings, development of plans for a consolidated school; (4) standard rural schools; (5) problems in the financial support of rural education; (6) consolidation—difficulties, methods, plans for local consolidation surveys; (7) pupil accounting—elimination and retardation in rural schools; an evaluation of New York and other free-tuition and compulsory education laws; (8) a system of records for the rural school administrator; or similar problems according to the needs of the class.

S 20. Administration and Supervision of Vocational Agriculture. Credit two hours. Daily except Sat., 10. *Caldwell* 143. Professor WORKS.

This course is designed for persons engaged in the supervision of vocational agriculture or those planning to enter such work. It deals with administration and supervision of agricultural education under the Vocational Education Act; State legislation; related Federal legislation; curricula. Visits to schools in New York and adjacent States are required as a part of the course.

S 21. Supervision and Administration of Home Economics. Credit four hours. Daily except Sat., 10-12. *Home Economics* 265. Miss CRAIG.

This course is intended for supervisors and for teachers of experience who are preparing for supervisory positions in home economics. The course is concerned with the analysis of the supervisor's work and with the methods of supervision. Among the problems presented for study and investigation will be the organization and the administration of homemaking departments; principles underlying the present-day changes in home economics education; principles underlying the organization of courses; evaluation of teaching; improvement of teachers in service; teachers' conferences and study classes.

S 29. Rural Elementary Curriculum. Credit two hours. Daily except Sat., 3. *Caldwell* 143. Superintendent COOPER.

What is the function of elementary education? How is the curriculum related to the accomplishment of this major purpose? What factors should be considered in making a curriculum for the rural elementary school? How should it be related to rural life, to agriculture? How should it be organized to fit the ungraded school? Should it differ at all from the curriculum for city schools? How should the contents of the curriculum be organized to promote most effective learning?

In what respect is the teacher responsible? How do the answers affect the several school subjects?

This course is intended not only for those who are to work specifically in this field, but also for any whose work is related to it, such as nature study specialists, junior project leaders, and principals of elementary schools.

S 31. Technique of Teaching in Rural Elementary Schools. Credit two hours. Daily except Sat., 9. *Forestry* 122.

The purpose of this course is to consider with as much detail as time permits the many specific problems of the classroom teacher. Some attention will be given to preparation for the first day of school, making a daily program, suiting the course of study to an ungraded school, providing educative seat work for children. Special attention will be given to methods of teaching in primary reading, phonics, beginning arithmetic, language work, problem teaching in geography and history, teaching appreciation in literature, developing hygienic and civic habits through school activities or other features.

S 33. Technique of Rural School Supervision. Credit two hours. Daily except Sat., 10. *Caldwell* 282. Mrs. COOK.

This course is devoted to a practical consideration of the district superintendents' problems in supervising rural schools. The topics considered will be adjusted to the interests and problems of the group: the function of the supervisor in promoting efficient teaching; standards for judging the many phases of school work, such as the selection of subject matter, the use of textbooks, the assignment, the conduct of the recitation. Available means of supervisory leadership are suggested for consideration. The experiences of the class, procedure and practice in other States, and the suggestions from principles of education will be utilized to develop practical plans of supervision.

S 43. The Theory of Education. Credit two hours. Daily except Sat., 11. *Caldwell* 272. Professor EATON.

Open to graduate students who have completed departmental requirements in educational psychology, educational methods, and educational administration, or whose study and experience give, in the judgment of the instructor, a sufficient familiarity with educational problems and knowledge of them to make the course probably profitable.

The theory of education—an examination, through discussion and readings, of the theoretical aspects of certain representative problems of organization, method, and administration of formal education, with a view to enabling the student to co-ordinate and unify the bases of his interpretation of educational problems, and particularly to clarify the relationships of vocational education to all education.

S 45. The Theory of Vocational Education. Credit two hours. Daily except Sat., 9. *Caldwell* 294. Professor EATON.

This course consists of discussions of questions developing the social, economic, philosophical, and psychological implications of a publicly maintained system of vocational education.

S 63. Science in the Rural Secondary Schools. Credit two hours. Daily except Sat., 9. *Forestry* 16. Professor PALMER.

This course is a study of the science program in rural high schools: the functions

of the recognized high school sciences such as general science, biology, zoology, physics, chemistry, and physical geography, together with methods of teaching. Designed primarily for experienced teachers.

RURAL ENGINEERING

S 41. Farm Mechanics. Credit two hours. T Th, 2-4:30, and S, 8-1. *Farm Mechanics Laboratory.* Assistant Professor ROEHL.

A course for teachers of agriculture in farm carpentry and such correlated drawing as farmers may find helpful in their construction and repair work; selection and care of farm shop tools; saw filing. Special consideration is given to preparing men to teach this work as a part of the vocational course in agriculture.

S 42. Farm Mechanics. Credit two hours. M W, 8-11, and S, 8-1. *Farm Mechanics Laboratory.* Assistant Professor ROEHL.

A course for teachers of agriculture in farm shop work including the following: harness repairing, rope work, fitting handles, window repairing, and painting. Special attention is given to the selection of jobs typical of a good farmshop, a consideration of the best methods of doing these jobs and a determination of the degrees of skill which should be attained in the performance of them. Students will be expected to demonstrate the performance of one such job.

S 43. Farm Mechanics. Credit two hours. Lectures, M W F, 11. Laboratory, M W, 2-4:30. *Farm Mechanics Laboratory.* Assistant Professor BEHREND.

A course in gas engines, power transmission, grain binder adjustments, and tractor plow adjustments. The gas engine work, confined mainly to the single cylinder farm engines, will cover engine timing, ignition, lubrication, fuels, carburetors, and engine repair and overhauling. Special emphasis will be given to the organization of this material for presenting to the high school students and the collection and preparation of laboratory material such as cardboard models, cut-out ignition coils, wiring diagrams, etc. Old farm engines will be brought in and repaired by the students. Under power transmission will come the erecting of a farm shop line shaft, the placing and belting of various machines, selection of pulleys and the preparation of belt lacing samples. The work on the binder and on plows will be covered mainly in field laboratories.

S 44. Farm Mechanics. Credit one or two hours. Lectures, T Th F, 8. Laboratory to be arranged. *Farm Mechanics Laboratory.* Assistant Professor BEHREND.

A course in pumps, rams, water systems, sewage disposal, and plumbing for rural homes. Shallow and deep well pumps of different types will be studied and old pumps overhauled and repaired. Various types of water systems, such as the simple gravity, pneumatic, and hydro-pneumatic systems, will be considered and a simple system supplying hot and cold water for kitchen and bathroom will be installed. The actual construction and operation of a single chamber septic tank will come under sewage disposal. The plumbing work will consist of a study of kinds of pipe, pipe friction, pipe fittings and fixtures, and the installation of a water system necessitating such work as pipe cutting, pipe fitting, cutting soil pipe, pouring soil pipe, joints, etc. An all day field trip is planned so that several farms may be visited and suitable water systems planned for each.

The selection of tools, literature (trade literature and bulletins), and laboratory material for teaching the work to high school classes will be discussed.

S 20. Farm Surveying and Concrete Work. Credit two hours. Lectures, Th F, 12. *Caldwell* 143. Field work, Th F, 2-5. *Farm Mechanics Laboratory*. Assistant Professor McCURDY.

A course in elementary surveying and in the use of concrete. The work in surveying includes the use of the compass, the tape, and differential and profile leveling. The work in concrete includes a study of the selection of materials, proportioning and mixing, and some construction such as sidewalk, watering trough, or septic tank.

RURAL SOCIAL ORGANIZATION

S 1. The Social Problems of Rural Communities. Credit two hours. Daily except Sat., 8. *Rural Engineering Lecture Room*. Lectures, reports, and discussions. Professor SANDERSON.

An introductory study of the social problems of rural communities as a basis for the social organization of rural life. Students will make individual studies of selected communities.

S 4. Introduction to Sociology. Credit two hours. Daily except Sat., 10. *G. S. 124*. Professor WEATHERLY.

Leading principles of the science with special emphasis on social forces. While the discussion is primarily concerned with laws and concepts, constant attention is given to their application to the practical problems of social organization. Lectures, discussions, and papers.

S 5. The Rural Community. Credit two hours. Primarily for graduate students. Prerequisite Course S 1 and Economics 55a and 55b or the equivalent. Daily except Sat., 10. *Animal Husbandry* 31. Professor SANDERSON.

A detailed study of the nature of the rural community; its historical development; a comparative study of types of rural communities; their social psychology and the methods of community development and organization.

S 8. Social Psychology of Rural Life. Credit two hours. For advanced students. Prerequisite, permission to register. Daily except Sat., 9. *Dairy* 222. Professor TAYLOR.

A study of the development and type of activity and thinking which arise naturally out of work with soil, plants, and animals; the development and type of rural mores; the influence of scientific farming, machine farming, co-operative enterprises, and other modern developments on rural thinking; the farmer's attitudes and viewpoints on general social problems, his part in moulding public opinion, and the influence of planes and currents of thought on him. In addition to these vocational considerations, this course will deal with such fundamental problems in social psychology as social solidarity, social unity, social co-ordination, social change, and social progress.

S 18. Agrarian Movements. Credit two hours. Daily except Sat., 11. *Dairy* 222. Professor TAYLOR.

An objective analysis of Agrarian Movements and Farmers' Organizations; an attempt to get at the fundamental causes, motives, and objects of different agrarian movements and organizations. Special attention will be given to American farmers' economic, political, and social organizations and movements, but similar organizations and movements throughout history and in all countries will also be studied.

This course has two objects: (1) To inform students of the successes, failures, and possibilities of farmers' organizations, and (2) to get at the psychological, and sociological fundamentals of farmers' organized efforts.

VEGETABLE GARDENING

S 1. Vegetable Gardening. Credit one hour. Lectures, M W F, 8. *Poultry 325.* Laboratory, F, 9-12 or 2-5. *Vegetable greenhouses and gardens.* Assistant Professor SCHNECK.

This is an introductory course in home vegetable gardening and school gardening, of value to those interested in the teaching of vegetable gardening in secondary schools. The course consists of studies of the principles and practices of gardening as applied to the production, harvesting, and storing of vegetables.

Planning and management of the garden, seed and seed-handling, growing early plants, special requirements of the various vegetable crops and insects and diseases will receive consideration. Laboratory exercises are planned to show application of principles discussed in the lectures. This course should be of aid to teachers of nature study and also to teachers in agricultural high schools.

S 2. Advanced Vegetable Gardening. Credit one hour. Lectures, T Th, 11. Laboratory, one field trip a week, time to be announced. *Poultry 325 and Vegetable Gardens.* Assistant Professor SCHNECK.

This course is intended for students who have had experience in vegetable production or handling and who desire to secure more knowledge of the scientific principles underlying the production and handling of vegetables.

The aim in this course is to show the application of fundamental sciences such as chemistry and botany to the production and handling of vegetables. It should be of special value to high school science teachers as a means of helping them to introduce scientific ideas to high school students in connection with vegetable gardening. It is also of value to students in home economics as a means of indicating the importance of vegetable food in the diet and the best methods of selecting and handling different kinds of vegetables for quality.

The field trips will be taken to the College gardens where experiments with vegetables will be studied and also to the best vegetable farms in the vicinity of Ithaca.

S 3. Systematic Vegetable Gardening. Credit one hour. Lectures and laboratories, M W, 2-5. *Vegetable Gardens, East Ithaca.* Assistant Professor SCHNECK.

This course should be of value to teachers of agricultural botany as well as to those interested in agricultural high school teaching.

Lectures on the origin, history, and botany of vegetables; lectures and laboratory studies of different vegetable types and varieties; their characteristics and adaptability to different conditions. Important varieties of all the different vegetables are grown in the gardens, giving an abundance of material for study as well as for preparing and judging exhibits.

POMOLOGY

S 1. Elementary Pomology. Credit three hours. Open to regular students in Agriculture who have had the prerequisites outlined in the *Announcement* of the College. Lectures, daily except Sat., 10. Laboratory, F, 2-4:30 and S, 8-10:30. *Roberts 202.* Assistant Professor MACDANIELS.

A study of general practices in pomology, including the propagation and care of orchard trees and small fruits, with emphasis on the underlying principles of plant behavior. Some phases of harvesting, storing, and marketing will also be considered. Laboratory work will include practical work in budding, grafting, pruning, and planting, and other orchard practices and also studies of growth habit and fruit bud formation. Laboratory fee, \$3.50.

S 19. Research. An opportunity for students to do advanced or graduate work either in the six weeks summer session or during the entire summer. Admission by special arrangement with members of the staff of the Department of Pomology.

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